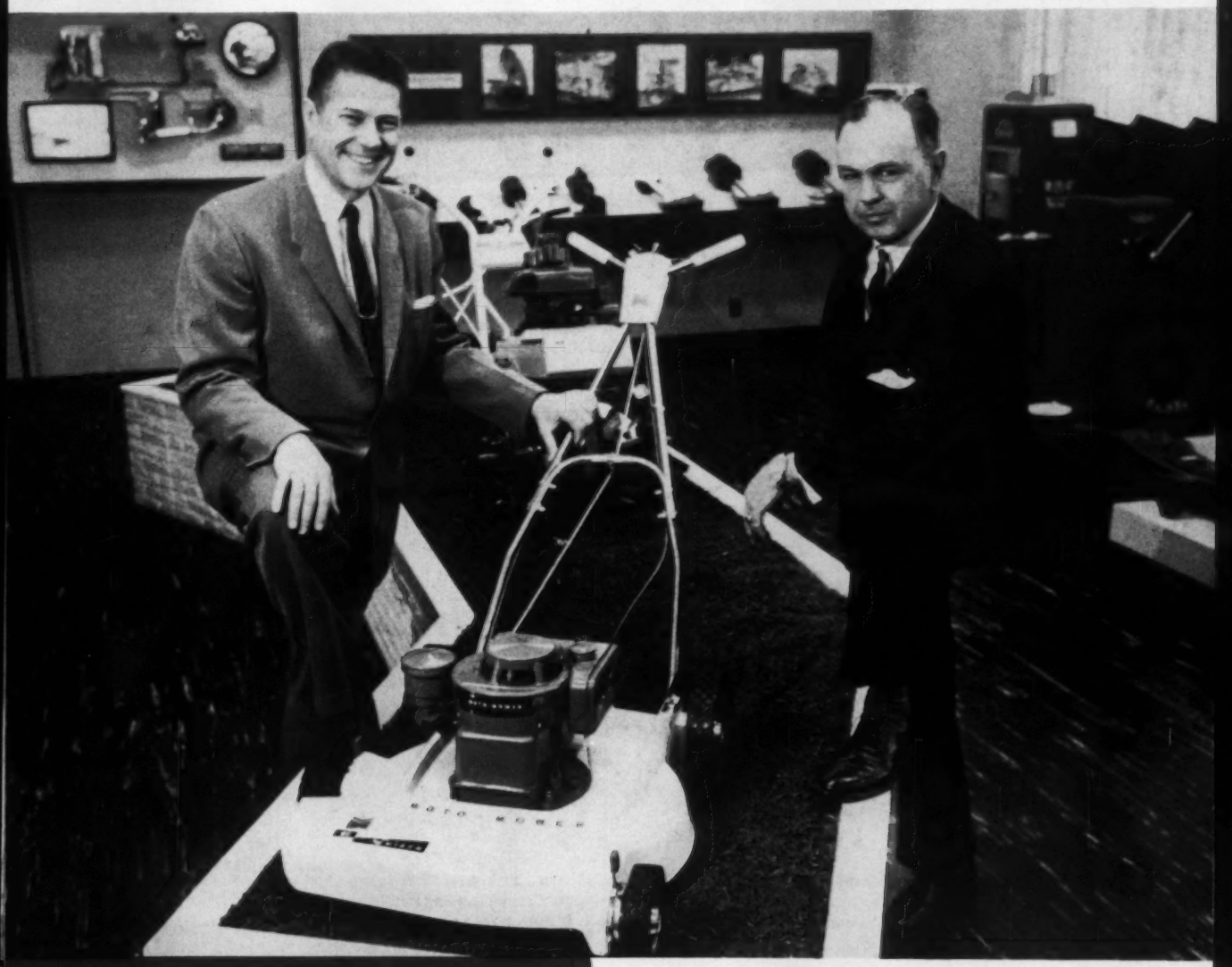
The IRON AGE

May 19, 1960 A Chilton Publication The National Metalworking Weekly



Dura Corp.'s Smith and Frerer:

Central Staff Pools Engineering Talents P. 149

Military Revamps Its Metals Buying Policies – P. 109

A New Report On "Make or Buy" – P. 117

Digest of the Week – P. 2-3

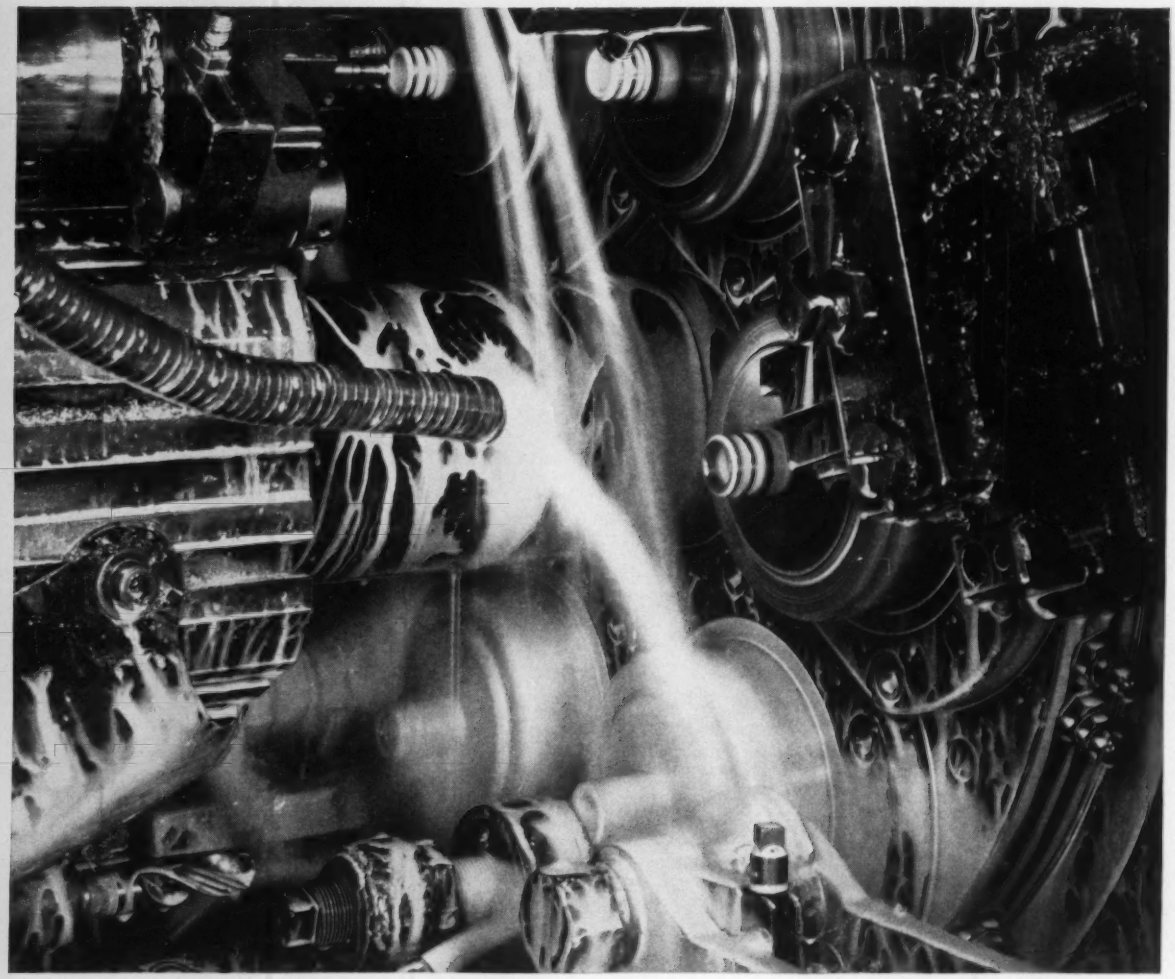
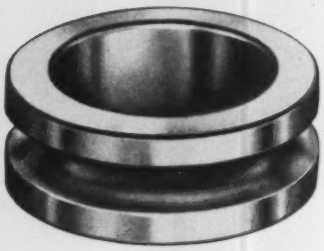


Photo courtesy SKF Industries, Inc.



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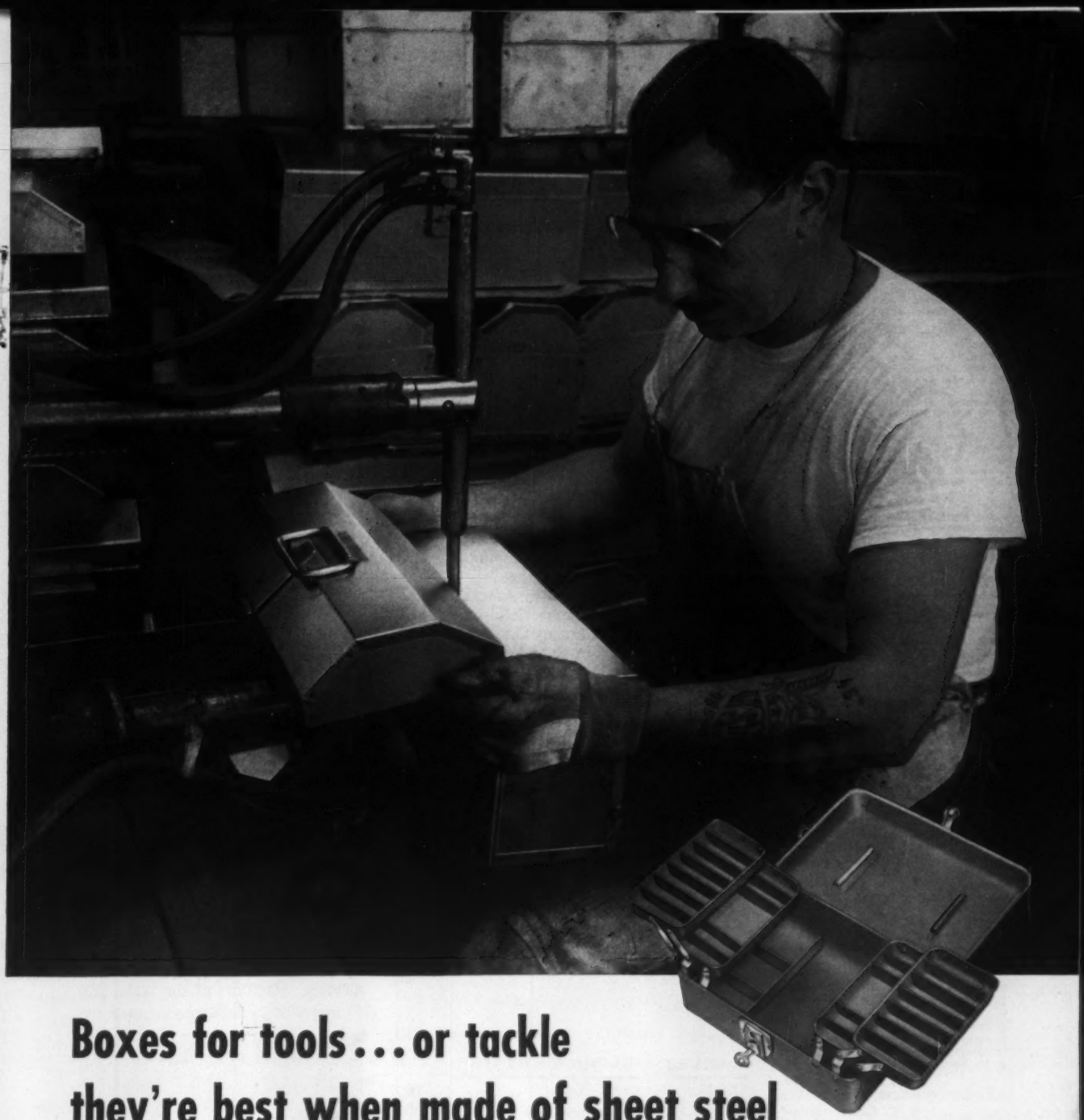

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The IRON AGE

May 19, 1960—Vol. 185, No. 20

Digest of the Week in

★Starred items are digested at right.

EDITORIAL

Summit Meetings: Let's Away With Them 7

NEWS OF THE INDUSTRY

★Military Revamps Metals Buying ... 109
Labor Issue: Right to Manage 111
★Common Market for Latin America . 112
★Founders Meet Problems Head-On .. 113
Bright Annealing Catches On 114
Trains, Boats Are in Rate War 116
Screw Machines Don't Always Pay .. 117
Buyers Dictate Expansion Plans 118
The IRON AGE Salutes 121

ENGINEERING-PRODUCTION

★Centralize Your Engineering Staff .. 149
★Gage Blocks Gain Stability 152
★Elephant Unit Speeds Drilling 154
★Impregnation Reclaims Castings 156
★Press Produces Precision Forgings .. 158
★Are Sub-Zero Coolants Useful? 160
Forgers Tame Refractory Metals 162

NEWS ANALYSIS

Newsfront 9
Report to Management 123
★Automotive 125
★Washington 129
★West Coast 131
Machine Tools 133

MARKET AND PRICE TRENDS

Market Planning Digest 107
★The IRON AGE Summary 201
★Purchasing 202
Iron and Steel Scrap Markets 206
Nonferrous Markets 210

REGULAR DEPARTMENTS

Letters From Readers 13
Industrial Briefs 134
Men in Metalworking 136
Patent Review 168
Free Literature 172
Design Digest 178
New Books 186
New Equipment 188
New Films 199
Clearing House 220

INDEX TO ADVERTISERS 225

News of the Industry

MILITARY METALS

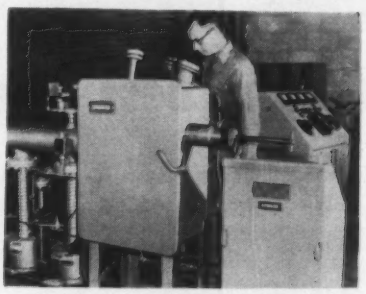
New Buying Setup — Starting next year, steel and nonferrous metal buying for all the services will be handled by one agency. Military Industrial Supply Agency will establish new distribution centers. P. 109

COMMON MARKET

For Latin America—In order to speed their economic development, several nations in Latin America are voting on a treaty to establish a common market. Other countries are expected to join it later. P. 112

FOUNDRY EXPOSITION

Selling Stressed—At their annual meeting, members of the American Foundrymen's Society were told the



industry's output has not kept pace with the nation's growth. Merchandising and modernization were stressed in both speeches and exhibits. Several speakers urged the industry to devote more time to selling. P. 113

Metalworking

Cover Feature

ENGINEERING TEAM: Dura Corp.'s president, J. T. Smith (right) and top engineer P. G. Frerer have learned the value of unifying the direction of engineering and product development. It brings top talent to product lines. P. 149

WASHINGTON

Muzzle Talk — The Defense Dept. wants to censor all advertising, speeches and press releases put out by its contractors. However, there's opposition to the plan, and its been called a violation of the Bill of Rights. P. 129

Engineering-Production Developments

GAGE BLOCKS

Gain Stability—Three new types of gage blocks, developed by the National Bureau of Standards, show greater dimensional stability than the best commercial types now on the market. Also, a new technique to measure the standards insures precise lengths. P. 152

HIGH-SPEED DRILLING

Tape Controlled—Probably the largest boring unit to date is now on the market. The big tape-controlled machine handles high-speed drilling, boring and gun drilling with precision. With it, you can put up to 56,000 holes in a 10 x 10 ft work area. P. 154

RECLAIM POROUS CASTINGS

With Impregnation—Batch-type impregnation in the automotive industry is saving more than 85 pct of scrap-product costs. One company is reclaiming aluminum carburetor-body castings which have been rejected in production line checks. P. 156

BIG-PRESS FORGINGS

Save on Chips—Precision big-press forgings offer a challenge to conventional and block designs. A single high-pressure forging precludes over 1000 lb of chips—prior to shipment. This excess weight in chips was already paid for. P. 158

SUB-ZERO COOLANTS

How Useful?—An aircraft study points up the effectiveness of various coolants in the machining of the tough brand of alloys. The report covers spraying liquid CO_2 to the tool tip, the use of flooding and mist with chilled coolants on five alloys. Each of the high-strength materials was subjected to six different machining conditions. The results are significant. P. 160

Market and Price Trends

AUTOMOTIVE

Labor Talks in '61—Big Three automakers are expected to rely on the same tactics that proved successful in 1958. And the union is expected to ask for the things it didn't get. P. 125

WEST COAST

Race Cars Readied — Los Angeles, race car capital, primes motor monsters for Memorial Day classic. Two new car features: Built-in jacks and aircraft-type fuel injection. P. 131

STEEL SUMMARY

No Price Hike — There's little chance for a steel price increase in the near future. Competition from imports and the low level of incoming orders have deflated any mill hopes for higher prices. P. 201

PURCHASING

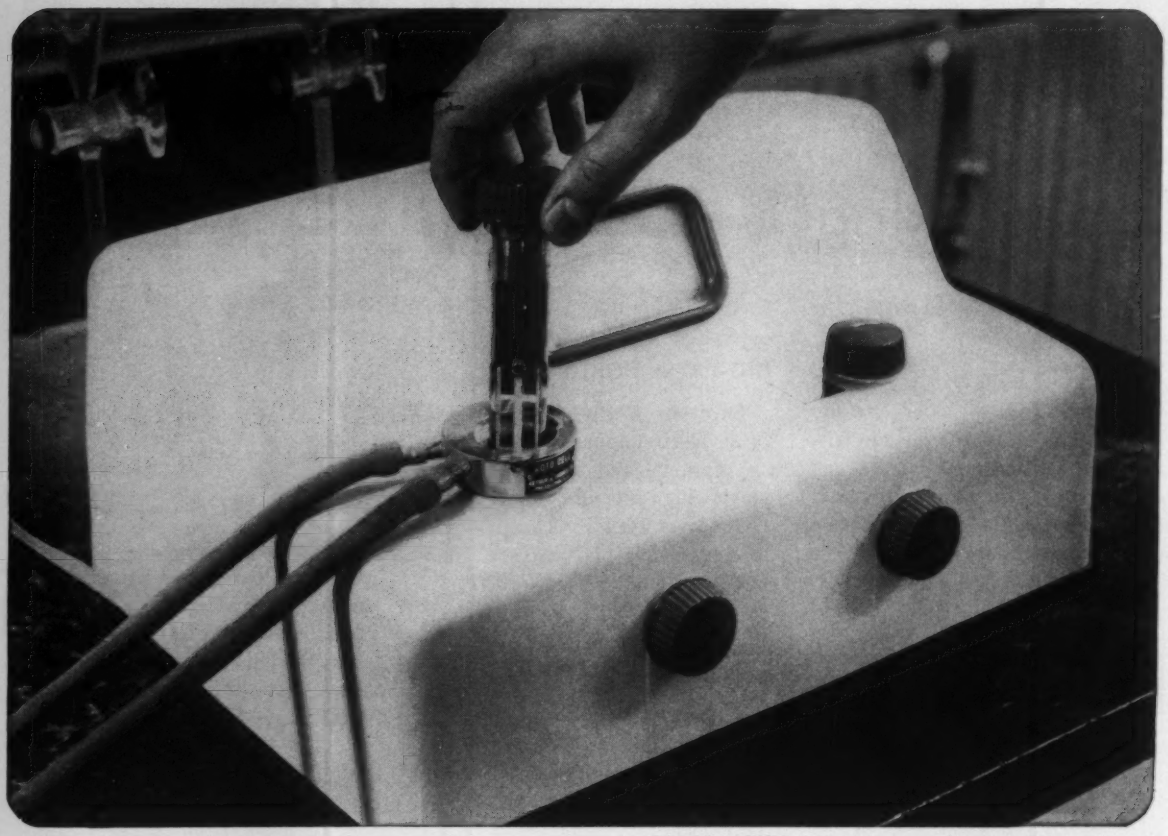
Trend Grows—The leasing of industrial trucks is becoming a boon to truckmakers. They find both short and long term leases are fast becoming popular with users who want to cut capital outlay. P. 202

NEXT WEEK

BLAST FURNACE COMEBACK

Pellets and Sinter — Yields of blast furnaces have gone over highest expectations with new pellets and sintered ore. Result is a comeback for blast furnaces which only recently were believed to be losing importance.

***Experience**—the added alloy in **Allegheny Ludlum** tool steels*



COLORIMETER (inherently extremely accurate) determines percentages of molybdenum, tungsten, cobalt and manganese in A-L tool steel to insure consistent, high quality.

Colorimeter measures exact chemical composition of Allegheny Ludlum tool steel melts

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Close control of molybdenum, tungsten, cobalt and manganese is at the heart of a good tool steel melt. In addition to the usual testing methods, Allegheny Ludlum's chemical laboratory checks these metals with Colorimetry because of its inherent, extreme accuracy.

On the basis of the Colorimeter's findings, it is possible to make carefully calculated furnace additions of ferro-alloys, insuring precise control over chemistry. This guarantees your receiving the *exact* analysis order after order, providing *uniformity of heat treatment, predictable dimensional changes, reduced grinding and standardized machining operations.*

Colorimetry is but one step toward careful control over composition. Allegheny Ludlum also sets exacting purchasing specifications on raw materials and scrap. Quality Control checks all incoming orders to see that they conform with these specifications. Another guard toward your getting your exact specifications: each ingot bears a metal tab showing heat number.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

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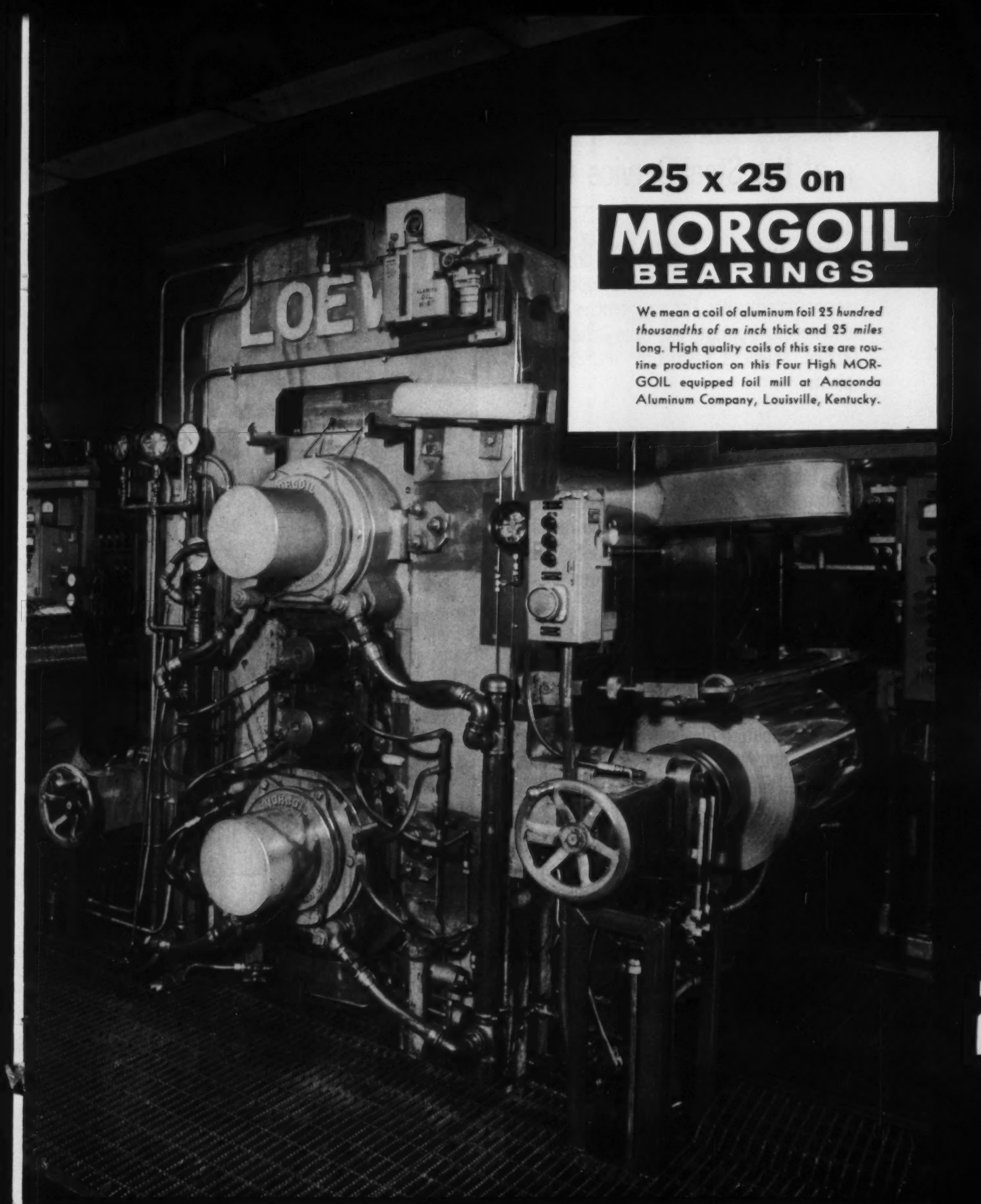

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Summit Meetings: Let's Away With Them

No one should be too surprised at the horrible state of East-West relations. The basic battle has always been between two world systems. Some day one or the other will be top dog.

We have heard talk of peaceful co-existence as if it were different than a cold war. There is no difference, nor will there ever be. Just because we are not aiming missiles at each other does not mean we are not at war.

If the West were not armed and prepared to defend itself it would be a dead duck in no time. And if the time ever comes when we let down our guard we will be as good as gone.

The Reds and Mr. Khrushchev are far more entranced with their own images. They are sober, egotistical people who see nothing, hear nothing and understand nothing that benefits others.

Summit meetings are a waste of time. They are used for political purposes. More often the Reds use them as a world platform for shadow-boxing to impress or threaten other nations.

What is said or done is not worth much. Communiques are lifeless; they must be because they are for world consumption. Any real meeting that wanted to get somewhere could not possibly do it in a world fish-bowl.

Personal piques, snubs and bushwa of the Red participants are enough to scare us. It is fantastic that the future of the world might rest on a mere fit of temper; this is frightening in our nuclear era.

No summit meeting ever produced anything solid. Experiences attending the latest one prove this. Heads of state, no less than heads of companies, do not get things done from the ground up. The real spadework must be carried out by experts, by detail men and by those who know and can be guided by history—and by awareness of national blind spots.

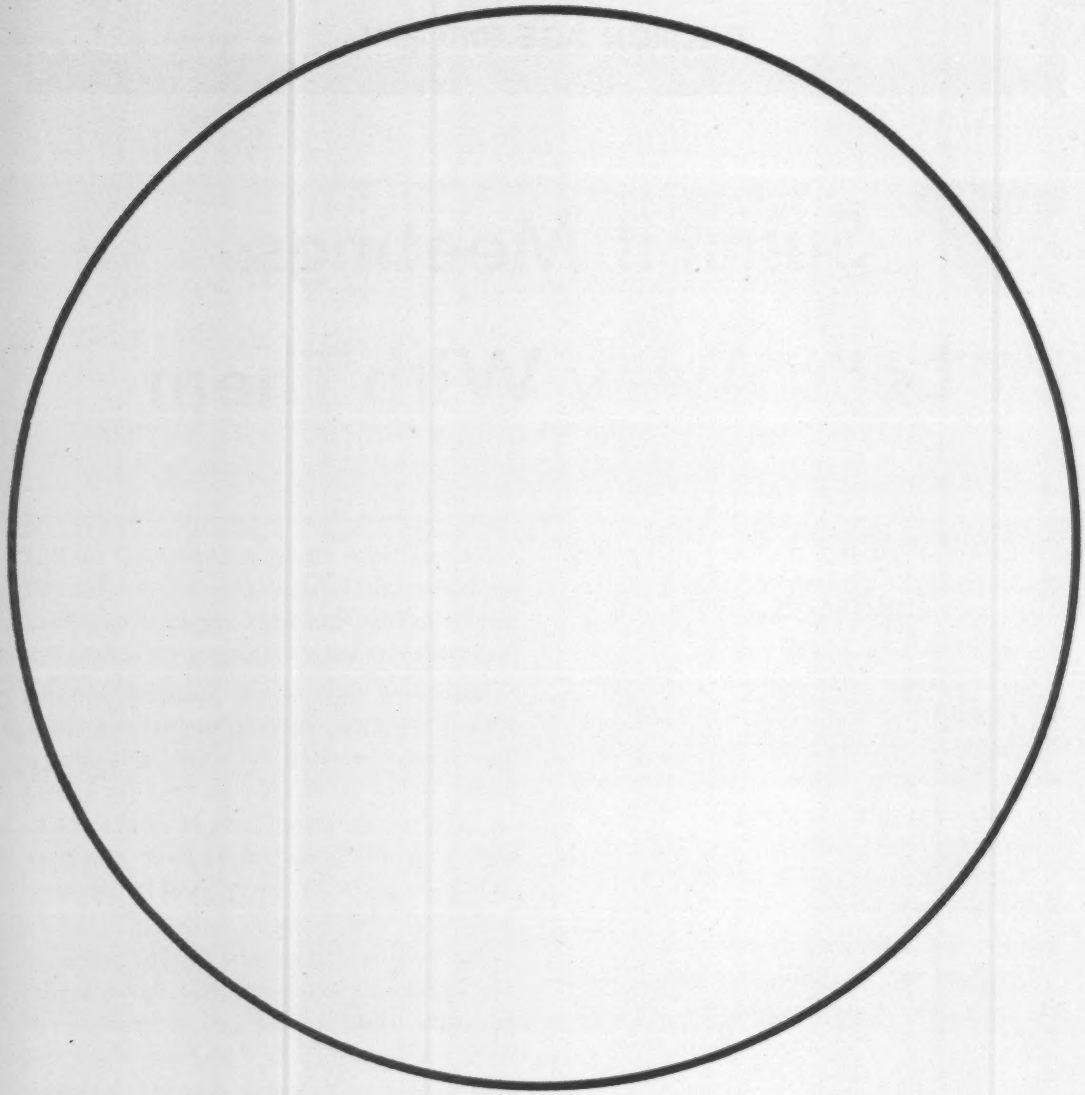
One thing we can be sure of: The actions of Mr. Khrushchev this week have shown beyond any doubt whatsoever the type of person we are dealing with—and the type we have always dealt with whether we knew it or not. This experience should put at rest any fancy ideas about the Reds' basic intentions. They are nothing but an aim to rule the world.

There never will be any lasting or worthwhile decisions at any so-called summit meeting. It won't work. It hasn't so far and the only reason the main characters went to the summit is because Mr. Khrushchev maneuvered them into it.

Tom Campbell

Editor-in-Chief

(Advertisement)



How many segments can you cut this circle into with four straight lines?

The first quick answer is, of course, eight. Obvious—but not the whole answer!

Actually you can make as many as 11 segments with just four straight lines. Looking beyond the obvious *often* pays dividends. At Ryerson we've made a science of this—and call it *Metalogics*.

How does Metalogics work for you? It helps you value-analyze any kind of problem in the selection and application of steel, aluminum, plastics, and metal-fabricating machinery. It searches out money-saving and money-making ideas and shows you how to apply them. And then it follows through with day-in-day-out service that also goes "beyond the obvious" in caliber and scope and dependability.

Ask your Ryerson representative to show how you can get the greatest possible value from this unique Ryerson service. He'll be glad to tell you—and you may be very glad you asked. (Incidentally, for answer to the segmented circle see page 134.) Joseph T. Ryerson & Son, Inc.—Service Center Plants Coast to Coast.

Forms Fiber-Metal Material

A process which combines ceramic fibers with metal to obtain almost unbelievable strengths has been claimed by Horizons Inc. Emphasizing that the technique is still experimental, Dr. E. Wainer, vice president and research director, nevertheless calls the results a "major scientific breakthrough." It offers a potential solution to some problems of space travel and other applications where ultra-high temperature resistance is a must.

Lubricates at 1000°F

High-Temp 2409 is a compound lubricant that consists of a synthetic fluid and a lubricating thickener. The fluid serves as a vehicle to carry the thickener to the lubrication area. At 500°F, the clean-burning fluid volatizes. The thickener remains and provides positive lubrication at temperatures up to 1000°F.

Electroplating Preparation

A quick and simple process prepares copper for electroplating. And it reduces porosity of thin electrodeposits. The new plating preparation replaces the conventional acid pickle by a brief dip in a 25-pct solution of ammonium persulfate —followed by a warm water rinse. This produces an unusually clean, oxide-free surface on the copper.

Welds 900 Parts per Hour

Just announced is an automated welding and assembly line that produces 900 automobile oil-filter cartridges an hour. It uses projection welding extensively and a lock-seam roll. Production is attained with only a single operator.

Core-Making Machine

A new concept in core making will be introduced with 1961 model cars. The process employs a new core-making machine which eliminates slow baking-core ovens. Finished cores for gray iron or aluminum are made in a few seconds. Other reported advantages include: uniform flow of cores for molding requirements; a reduction in core inventories; and higher quality castings which result from the core's better physical properties.

Nitrogen Affects Titanium

Effects of interstitial element content, including oxygen, carbon and nitrogen, on the tensile properties of alpha-beta titanium alloy Ti-140A have been determined at temperatures ranging to 1000°F—and at strain rates from 0.05 to 19,000 in./in./minute. Tests show that the tensile properties are strongly dependent on nitrogen content alone.

Tape Controls Aid Casters

Being demonstrated at a national exposition is the first known application of tape controls to heavy foundry equipment. The device consists of a hydraulically operated sandslinger with magnetic tape controls. This system automatically reproduces the ramming path of a mold made by an operator. Succeeding molds are carbon copies —made without operator intervention.

Improves Beryllium

With only a slight reduction in oxide content, beryllium melted by electron bombardment has an improved cast structure and better machinability than induction-melted, vacuum-cast material. Compacted beryllium flakes or chips have been melted and cast in an electron-bombardment furnace. The result is smooth 3-in. diam ingots which are free of voids, shrinks, cold shuts, and similar casting defects.

Huge Heat Treating Setup

One of the world's largest heat treating furnaces is nearing completion at a west coast aircraft and missile plant. This vertical gantry-type furnace will take a part almost 27-ft long and has a 7-ft working diameter. Vertical design ensures minimum warpage of long parts and saves space. The new unit will permit heat treatment of large aerospace parts—a necessity in missile work.

9 trouble-free years— still no trouble in sight

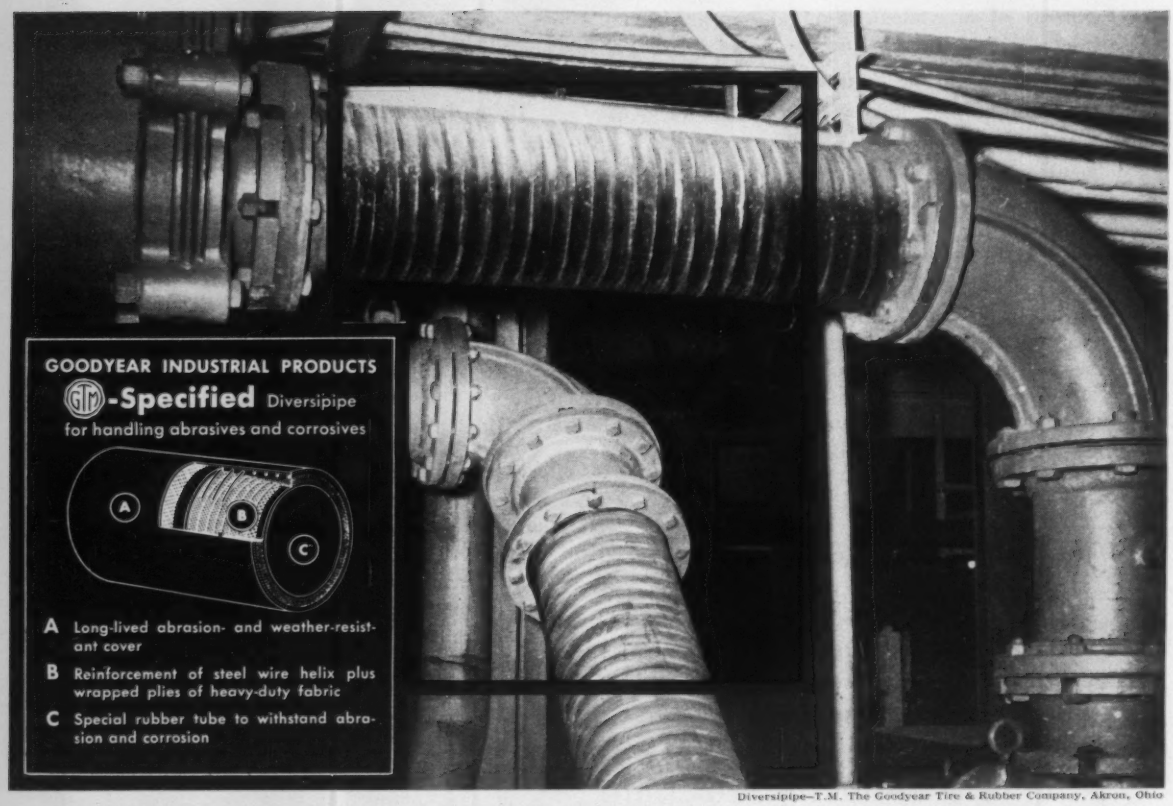
HANDLING the murderous abrasion of iron-ore slurry was only part of the problem when they added new facilities at this big Northeastern mine. There was also incessant vibration from pumps and refiners—certain to encourage leakage and shorten the life of just about any kind of slurry lines used.

But not if the lines were Diversipipe: recommended by the G.T.M.—Goodyear Technical Man. That super-tough rubber pipe fights off abrasion—absorbs shock. A bonus benefit: its flexibility makes intricate installations easier and less expensive.

At last report, the Diversipipe had been handling minus 14 mesh slurry—at 10 feet per second—for 9 straight, trouble-free years. And it's still giving like-new performance.

In fact, Diversipipe has proved the moneysaving answer to tough material-handling problems like this in many a plant. For expert tips on handling pumpable materials—especially abrasives or corrosives—check with the G.T.M. through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*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Happy Birthday

A hundred years ago Francis A. Pratt and Amos Whitney, a pair of young mechanics, opened a small business run on a part-time basis. This month Pratt & Whitney Co. celebrates its 100th birthday.

From a one room operation (it burned down when the company was just getting on its feet) the company has grown to where it now occupies a 115-acre site at West Hartford, Conn., and has a 1,250,000 sq ft plant.

Modern Warfare—The founders, Pratt and Whitney, were both working for the famed Colt Firearms Co. when they decided to undertake their venture. Both experienced mechanics, they found little trouble getting work for their concern. Within a couple of years the skill of trained gun designers was in great demand. The Civil War was raging and the government wanted interchangeable rifle parts for the soldiers in the line.

Pratt & Whitney quickly filled the government's needs. It developed machine tools that made it possible for highly accurate firearms to be produced in volume.

War Effort—Ever since that time, the firm has played a big part in war production. Following World War I the Pratt & Whitney Aircraft Co. was formed. This was later sold to United and Transportation Co. But this didn't happen until the renowned radial air-cooled engine was developed.

And now Pratt & Whitney is directing its engineering planning toward the products that will be needed in the new era of missiles and of space exploration.

All For One

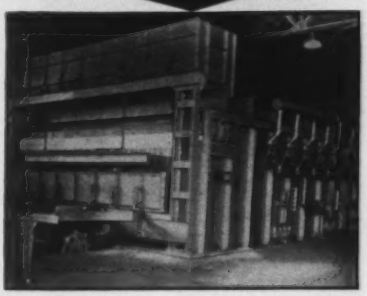
There's been a lot of fuss about integrating the armed forces. But we can prove that it's a working system. The proof was supplied when our editor called at the Navy's General Stores Supply Office in Phila. He was working on a story for this week's issue on the new single manager plan for military metals buying (see page 109).

Under MISA (Military Industrial Supply Agency) metals purchasing for all the services will be centered at Philadelphia.

But it will be a joint operation with all the services represented. When our man was "briefed" on MISA there was one Army uniform among all the Navy garb. It belonged to Lieut. Col. J. J. Powers who is assistant director of the single manager planning staff.

WAY BACK WHEN: Key men in the Pratt & Whitney manufacturing and sales staff posed for this group photograph in 1886. Francis Pratt and Amos Whitney, founders of the firm, are seated in the center of the front row.

FIRST CHOICE FOR PIPE ANNEALING



R-S CAST IRON PIPE ANNEALING FURNACES USED BY EVERY LEADING PIPE FOUNDRY

For more than 35 years leading producers of centrifugal cast iron pipe have relied on chain conveyor type annealing furnaces designed and built by R-S.

R-S experience goes back to the first centrifugal cast iron pipe produced in this country more than 35 years ago. Since then cast iron pipe annealing furnaces have been a specialty with R-S engineers. Their experience and development of furnaces to meet the needs of annealing cast iron pipe has kept pace with the industry. Today, R-S pipe annealing furnaces offer greater uniformity of heating through all ranges and precision controlled cooling.

R-S pipe annealing furnaces range in capacities from 15 to 35 tons per hour. Write for complete information on the newest developments in centrifugal cast iron pipe annealing by R-S.

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NORTH WALES, PA.

R-S FURNACES

COMMERCIAL heads up "engine packs"

SMOOTH, ACCURATE FLANGE of COMMERCIAL heads is used as fitting up template and welding fixture in applying shell wrapper. Note embossed ribs giving heads added strength.

COMMERCIAL tank heads are important components of reusable containers fabricated by the New Castle Welding & Mfg. Co. of New Castle, Pa. for storage and shipment of army tank engines.

Built-in "bench marks"—Since containers are pressurized, humidity-controlled, and rugged enough to survive 5-foot free fall with motor weighing 3700 lb. mounted inside, it was imperative for tank heads to fit snugly—integrate smoothly. In fact, the precision uniformity of the flanges of COMMERCIAL heads serve as gauges for fitting the wrapper sheet, speed assembly, make welding easier and faster.

Head details—Engine container heads were custom-made (60" long diameter, 11 gauge QQ-S-640 steel, 1½" straight flange) by COMMERCIAL to rigid specs. COMMERCIAL engineers also designed the embossed ribs on the heads for greater impact resistance. With over 30 years experience and ingenuity in cold forming of steel, COMMERCIAL produces heads with improved metal quality in presses up to 2000-ton capacity. Three plants—Youngstown, Chicago, Salt Lake City—strategically located in important steel producing centers, are keyed to expedite your order.

For fast delivery—COMMERCIAL offers standard heads from stock made with a complete range of solid dies in all standard sizes from 12" to 72" O.D., in all popular gauges up to ½" thickness. Heads can be furnished for code or non-code pressure vessel construction from steels to meet the required specifications. Types furnished include flanged and dished, ellipsoidal, hemispherical, flanged only, double dished and obround. For full information on heads in stock for immediate delivery, write to Commercial Shearing & Stamping Company, Dept. K-21, Youngstown 1, Ohio.

Specialists in the shape of things to come

COMMERCIAL
shearing & stamping

Helpless Feeling

Sir—The editorial in your issue of April 28, 1960, titled "Running a Business: It Gets Tougher Every Day," very ably expressed the thinking that has been in our minds for several years.

We want to send copies of it to interested parties in Congress and would like to have about 150 copies of it for mailing to them—with a letter of our own.

Never has small industry felt so helpless in the operations of its business. From every side we are harassed until we feel there is a sinister effort being made to eliminate the capitalistic system which has made our country so successful in the past.

There seems to be utter indifference on the part of everyone as to what happens to the welfare of the country and the people in it, and we would like to make our small effort to stop or at least slow up the destructive process.

It gives us small businessmen considerable consolation to see in print, our thinking, so clearly set forth as it is in your editorial. At least someone seems to be aware of our problems.—R. J. Redmond, secretary, The Buckeye Foundry Co., Cincinnati, O.

▪ **Copies will be in the mail soon.—Ed.**

"Sixteen Tons"

Sir—Your editorial in the April 28 issue outlines my position and expresses my views exactly.

I have been the manager or president of a small company (dollar volume as much as $325,000 annually) for 13 years, and you better believe I've done my share of griping, but to no avail.

My favorite song, and almost a company theme song is Ernie Ford's "Sixteen Tons."

Please mail tear sheets of your editorial to the Hon. Bruce Alger, U. S. Representative, Texas, and U. S. Senators Lyndon B. Johnson and Ralph Yarborough, both of Texas.—J. E. Hannon, president, General Boat Corp., Grand Prarie, Texas.

▪ **Copies have been sent to the legislators.—Ed.**

For Publication

Sir—May we have your permission to use one of your editorials in our company publication, the "Bull Ladle?" The editorial appeared in the April 28 issue, and is entitled "Running a Business: It Gets Tougher Every Day."

Your statements in the editorial are in accord with some facts we have been bringing to the attention of our workers recently in our publication.—J. P. McClendon, supervisor services, Stockham Valves & Fittings, Birmingham, Ala.

▪ **Permission granted.—Ed.**

Ductile Ceramic Tools

Sir—On the Newsfront page of your April 28 issue, a short announcement appeared on ductile ceramic crystals of magnesium oxide that had been developed here at Norton Company.

It was stated that these would lead to ductile ceramic tooling, a development that would be both sensational and quite useful if it were true. It appears, however, that someone has misinterpreted some recent papers published by Norton Co. research engineers.

Inquiries are already being received and it is necessary to tell those inquiring that the article in The IRON AGE was in error.

There is no ductile ceramic in sight that would be useful as a cutting tool. Perhaps you wish to insert a statement in a subsequent issue that would clarify this misunderstanding. — G. W. Barnes, Product Engineer, Norton Company, Refractories Div., Worcester, Mass.

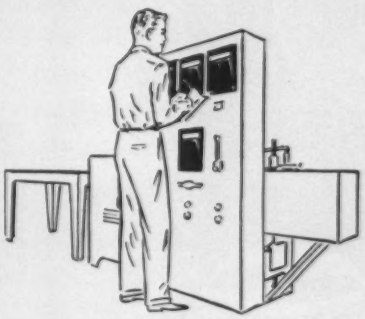
▪ **Our apologies.—Ed.**

W. C. "BILL" PINE, Hayes Chief Metallurgist, reports . . .

BRAZING CALLS FOR KNOW-HOW PLUS SHOW-HOW

Pioneer of controlled atmosphere heat treating, and developer of the *first* electric furnace for stainless steel brazing . . . Hayes today offers you one of the most extensive lines of furnaces and atmosphere generators for all types of metal bonding operations.

Hayes "KNOW-HOW" provides a customized brazing technique which takes into consideration every aspect of the job: Selection of alloys, placing and fixturing of work, choice of atmospheres, proper time-temperature cycles. Whatever the brazing application — from aluminum (900°F range) to platinum (3400°F range) — Hayes "SHOW-HOW" then proves the technique on full production-line equipment in our lab.



The Hayes answer to your brazing problem comes to you as a *complete package*. Our engineers provide free start-up service to duplicate laboratory results in your plant . . . fully instruct your staff to assure economical, maintenance-free brazing operations. The end product: a "Results Guaranteed" furnace-atmosphere combination that helps improve your product, increase production, and reduce costs. Write today for Bulletin 5711 B describing typical conveyor-type brazing furnace.

C. I. HAYES, INC.

821 Wellington Ave. • Cranston 10, R. I.
Established 1905

ELECTRIC FURNACES

It pays to see Hayes for metallurgical guidance, lab facilities, furnaces, atmosphere generators, gas/fluid dryers.

12 B&W IFB lined single stack annealing covers in use in the strip annealing department of Weirton Steel Company, a division of National Steel Corporation, at Weirton, West Virginia.

WEIRTON STEEL COMPANY uses lightweight B&W Insulating Firebrick for single stack annealing covers.

These 12 covers, lined with B&W K-20 Insulating Firebrick, have been in service more than two years in the annealing of low and high carbon strip from Weirton's 54″ strip mill. Identical in construction, the covers are over 17 feet from base to skew and over 10 feet in diameter. The domes are of 9″ K-20 IFB construction.

The K-20 is one of B&W's *lightweight* Insulating Firebrick. In fact, B&W K-20 IFB are at least a third of a pound lighter than other 2000 F insulating firebrick. This means savings in the overall weight of portable covers. Additional savings in fuel consumption and cycle time are possible because lightweight B&W IFB store and conduct less heat. Heat is kept in the furnace, not in the lining.

This application points out advantages of light weight in insulating firebrick constructions. And B&W makes the *lightest* weight insulating firebrick. Consult your B&W Refractories Representative for information on how you can profit with lightweight B&W IFB.

Bulletin R-2-H available on request.

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

R-617

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

COMING EXHIBITS

Design Engineering Show — May 23-26, Coliseum, New York. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

New England Material Handling Show—June 6-8, Commonwealth Armory, Boston. (Material Handling Institute, One Gateway Center, Pittsburgh 22.)

Production Engineering Show—Sept. 6-16, Navy Pier, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Machine Tool Exposition—Sept. 6-16, International Amphitheatre, Chicago. (National Machine Tool Builders Assn., 2139 Wisconsin Ave., Washington 7, D. C.)

Iron & Steel Show—Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

Die Casting Exposition & Congress—Nov. 8-11, Detroit Artillery Armory, Detroit. (The Society of Die Casting Engineers, 19382 James Couzens Highway, Detroit 35.)

MEETINGS

MAY

National Assn. of Purchasing Agents—Annual international convention and Inform-A-Show, May 22-25, The Biltmore Hotel, Los Angeles. Association headquarters, 11 Park Place, New York.

Industrial Heating Equipment Assn., Inc.—Annual spring meeting, May 22-25, The Homestead, Hot Springs, Va. Association headquarters, 1145 19th St., N. W., Washington, D. C.

Aluminum Wares Assn. — Annual meeting, May 23-24, Greenbrier, White Sulphur Springs, W. Va. Association headquarters, First National Bank Bldg., Pittsburgh, 22, Pa.

(Continued on P. 16)

NEW!

2½-lb. Pressurized Dry Chemical

5-lb. Pressurized Dry Chemical

Kidde dry chemicals kill more fire faster!

Granted top rating by Underwriters' Laboratories, these two new Kidde dry chemical extinguishers pack the *extra* punch you need to knock out stubborn blazes. These 2½- and 5-pound Kidde units put out as much fire as eight and sixteen one-quart carbon tetrachloride portables respectively. They are perfectly balanced for fast action, are light in weight, easy to operate even while wearing gloves. And — no pin to remove, no valves to turn, no inverting or bumping needed. Just aim at fire and press the lever! Pressurized, they can be easily and quickly recharged with air or nitrogen. No pressure cartridge needed. Write for more information on these new Kidde extinguishers — easiest-to-operate of all dry chemical portables.

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.,
549 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

VALVOLINE
Tectyl
protects metals against RUST

VALVOLINE'S amazing Tectyl rust preventives protect metal surfaces against *rust and corrosion* during storage and shipping.

Low-cost Tectyl compounds are easy to apply by brush, spray or dip and just as easy to remove. They protect metal surfaces against the effects of snow and rain... salt air, humidity, perspiration and corrosive fumes.

Tectyl rust preventives meet exacting government specifications.

Write today for these two helpful Tectyl charts

1. "Valvoline Tectyl U. S. Government Approved Packaging and Preservative Chart." Gives the Army, Navy, Air Force and other Government Agencies' specifications and applications.

2. "Valvoline Tectyl Industrial Rust Preventive Comparison Chart." Specifies applications covering the industrial field.

VALVOLINE
Tectyl RUST PREVENTIVES

VALVOLINE OIL COMPANY, Freedom, Pennsylvania
A Division of Ashland Oil & Refining Company

MEETINGS

(Continued from P. 15)

American Supply & Machinery Mfrs. Assn., Inc.—Triple industrial supply convention, May 23-25, Chicago. Association headquarters, 2130 Keith Bldg., Cleveland.

Magnesium Assn.—Annual membership meeting, May 23-27, London, England. Association headquarters, 122 E. 42nd St., New York.

American Iron and Steel Institute—General meeting, May 25-26, Waldorf-Astoria Hotel, New York. Institute headquarters, 150 E. 42nd St., New York.

Wire Reinforcement Institute—Annual spring meeting, May 30-31, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, National Press Bldg., Washington 4, D. C.

Concrete Reinforcing Steel Institute—Annual meeting, May 30-June 4, Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 38 S. Dearborn St., Chicago.

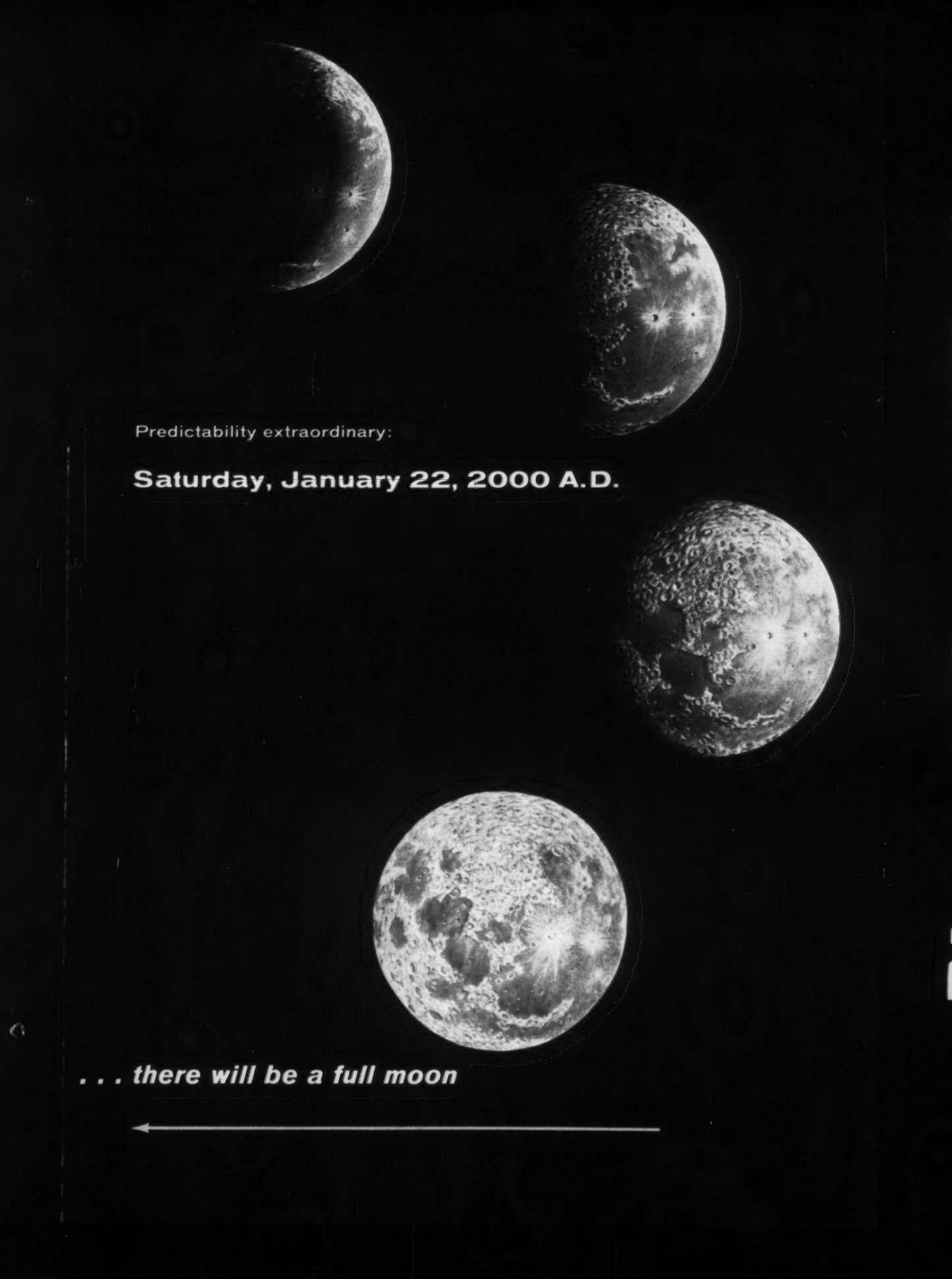
JUNE

Appalachian Underground Corrosion Short Course — June 1-3, W. Va. Univ., Morgantown, W. Va. Contact J. H. Alm, Rm. 605, 2 Gateway Center, Pittsburgh 22.

The Industrial Wire Cloth Institute—Annual resort meeting, June 3-7, Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 630 Third Ave., New York.

The American Society of Mechanical Engineers—Semi-annual meeting, June 5-9, Statler-Hilton, Dallas. Society headquarters, 29 W. 39th St., New York.

Malleable Founders Society—Annual meeting, June 6-8, Elbow Beach Surf Club, Hamilton, Bermuda. Society headquarters, 781 Union Commerce Bldg., Cleveland.


Predictability extraordinary:
Saturday, January 22, 2000 A.D.
. . . there will be a full moon

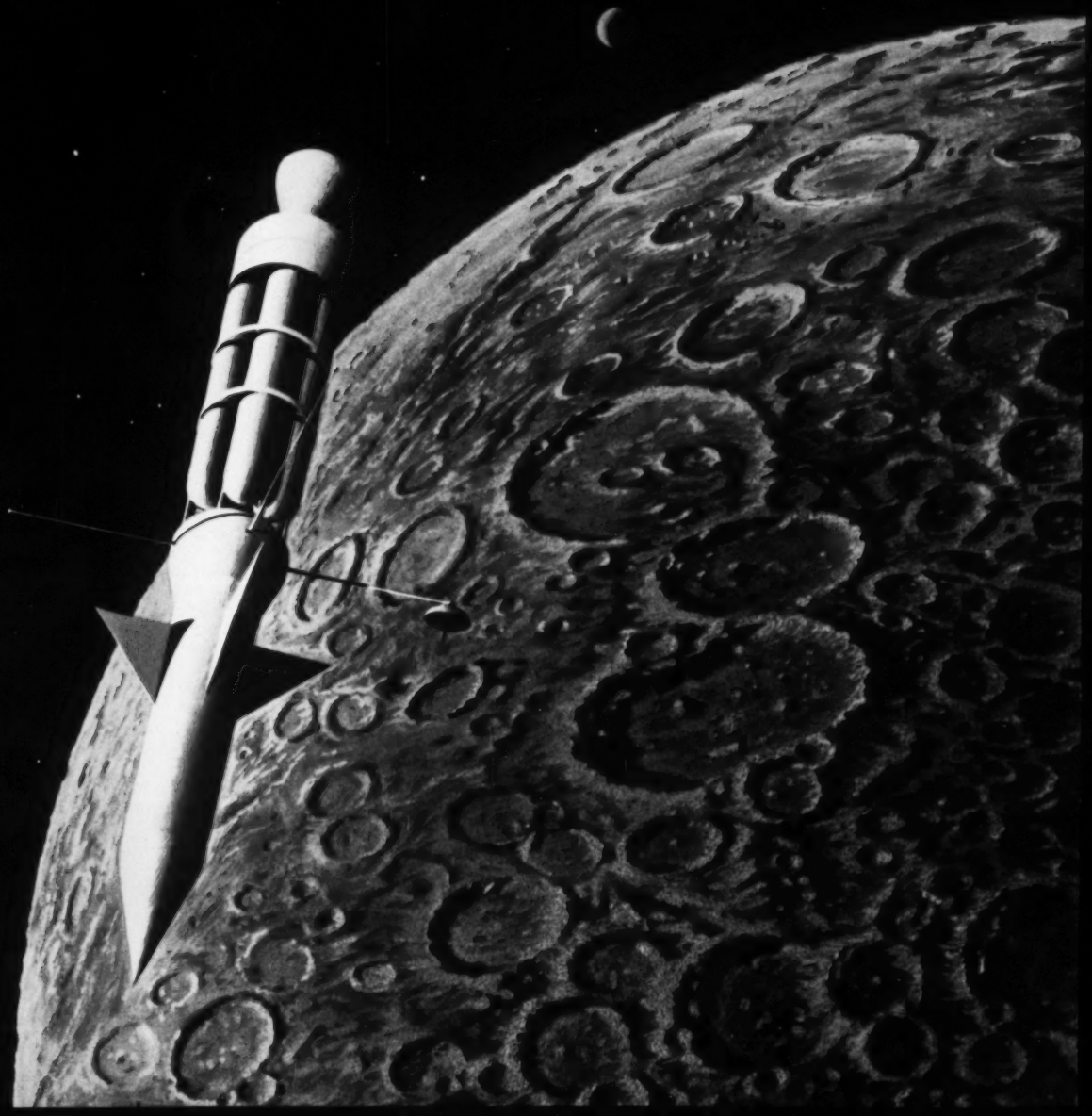
Don't you wish you could count on

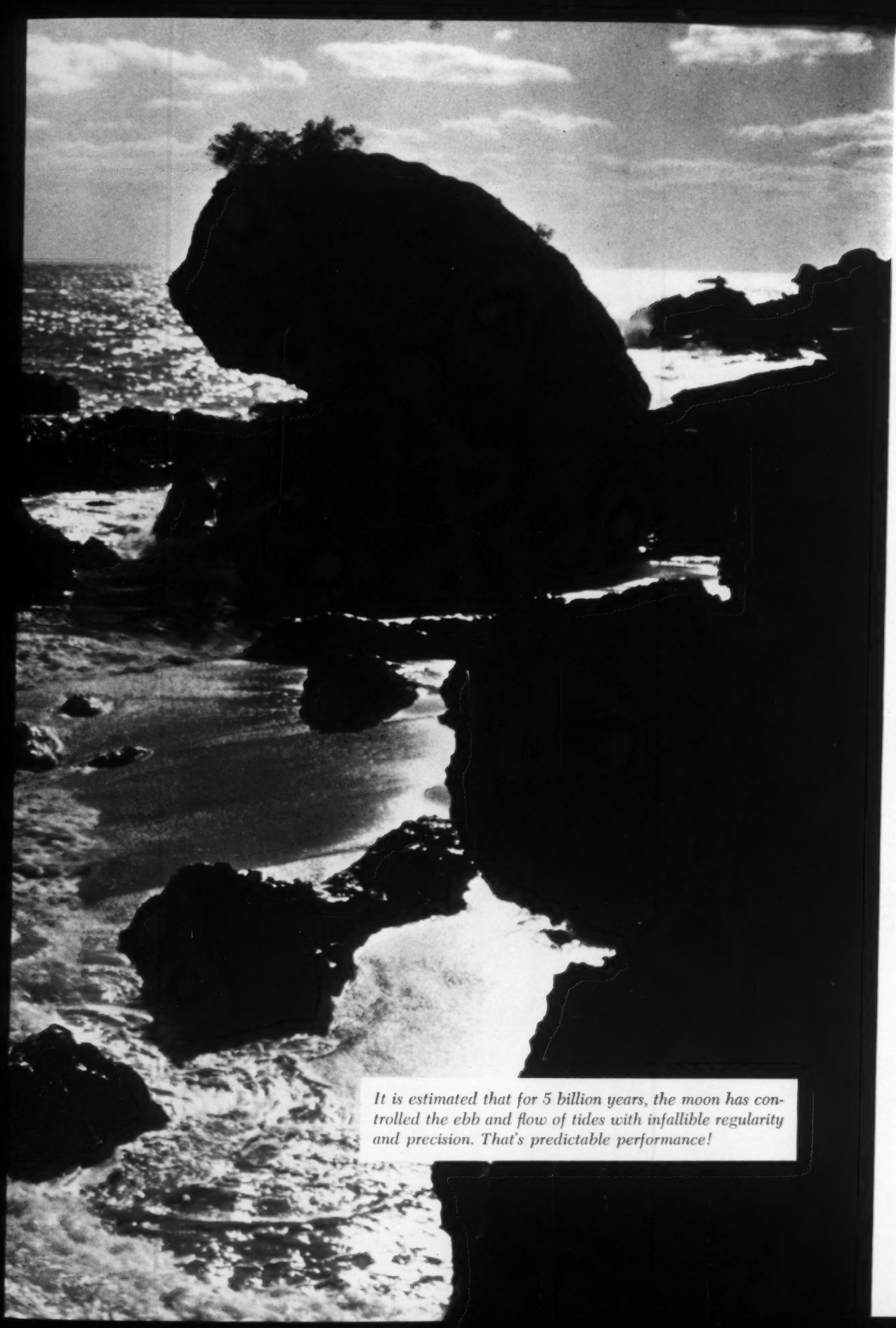
such predictable performance from the

high temperature alloys

you use?

(especially when you're "shooting for the moon" in product reliability!)





It is estimated that for 5 billion years, the moon has controlled the ebb and flow of tides with infallible regularity and precision. That's predictable performance!

predictable as the moon . . . reliable as the tides

Carpenter high temperature alloys...

MEL-TROL® processed...

give you new standards of uniformity

in fabrication and performance

No compromise! In high temperature parts, it's all or nothing. The demands of production and service must both be met. When conventional alloys can't meet the requirements, the cause is often lack of uniformity in the steel itself. It can usually be traced to variations in toughness and composition between the outside and core areas of the ingot.

New, exclusive MEL-TROL process! In addition to other unique quality controls, it includes a patented mold which reduces segregation of harmful impurities during solidification of the ingot. This ingot is more uniform, freer from segregation. Result: *Carpenter* High Temperature Alloys give you clean, sound, tough metal from outside to core . . . in every bar. And only *Carpenter* can assure you of such predictable performance . . . through production and into service.

No premium price! *Carpenter* High Temperature Alloys made to MEL-TROL quality standards are offered at no extra cost. For additional information contact your nearby *Carpenter* SERVICE-CENTER. Other products available are: Matched Tool and Die Steels—Stainless Steels—Electronic, Magnetic and Electrical Alloys—Special-Purpose Steels—Tubing and Pipe—Fine Wire Specialties.

New concepts in service! Increased capacity... with the addition of new melting and finishing facilities. Better-than-ever quality . . . more research . . . more technical assistance . . . more local warehouses . . . *Carpenter* is growing bigger and better in all directions. Building upon a long history of pride in craftsmanship . . . backing up our faith in the future with dollars on the line . . . we are combining the best of modern technology and traditionalism. All these are reasons why *Carpenter* is known as . . . *a new company 70 years old.*

Carpenter steel

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

local service from coast to coast!

stainless steels! tool and die steels! special-purpose alloy steels!

Check your nearby Carpenter SERVICE-CENTER *first:*

Mill-Branch Warehouses

Atlanta, Ga.
Bridgeport, Conn.
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Houston, Texas
Indianapolis, Ind.
Los Angeles, Calif.
Milwaukee, Wis.
Mountainside, N. J.
New York, N. Y. (Woodside, L. I.)
Philadelphia, Pa. (Fort Washington)
Providence, R. I.
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Cambridge, Mass.
Des Moines, Iowa
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Evansville, Ind.
Grand Rapids, Mich.
Hialeah, Florida
Jackson, Mich.
Jackson, Miss.
Kansas City, Mo.
Louisville, Ky.
Memphis, Tenn.
Minneapolis, Minn.
Nashville, Tenn.
New York, N. Y.
Pittsburgh, Pa.
Portland, Ore.
Phoenix, Arizona
Seattle, Wash.
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Tampa, Florida
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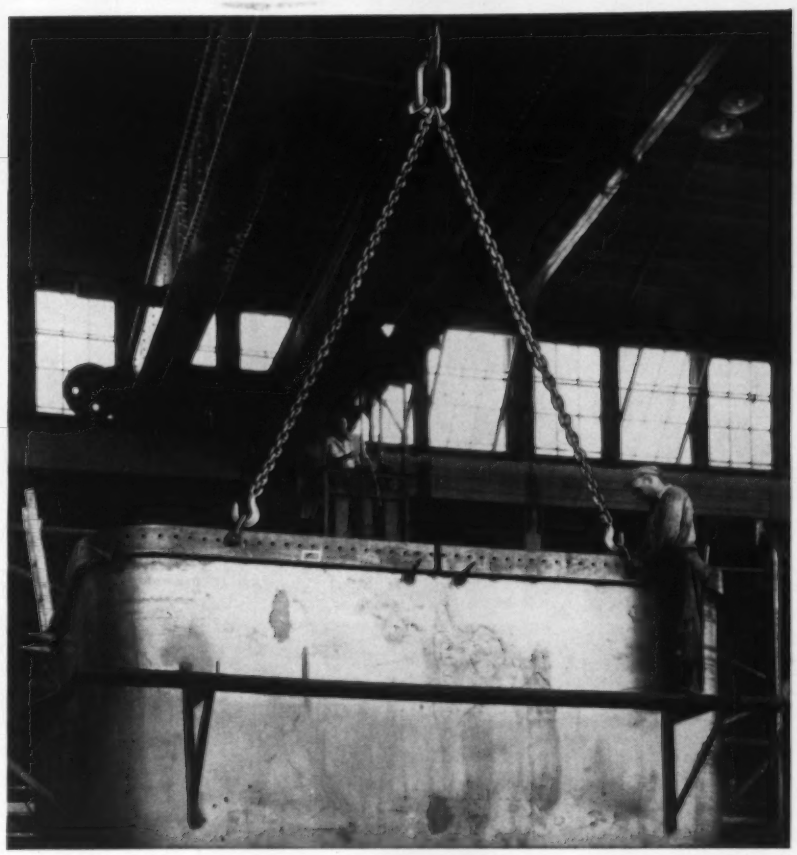
The Carpenter Steel Company, Reading, Pa.

NOW... Get One-Day Service from our Authorized Distributor on



NEW ACCOLOY KUPLEX SLING CHAINS

• Imagine... you can now get ***one-day delivery service*** on ACCOLOY KUPLEX Chain Slings like you see here from our nearby Authorized KUPLEX distributor! This really remarkable development in speedy sling service is made possible by the new KUPLEX coast-to-coast system of localized service to meet your sling chain needs. No more waiting around for shipments from the factory . . . no more returning damaged slings to the factory for repairs. Our KUPLEX distributor is equipped to offer you both of these valuable services, and he's as near to you as your telephone.

KUPLEX is a modern sling chain that has been tried and proved through thousands of applications. Its streamlined form greatly reduces the chance of snagging on other objects. KUPLEX Sling Chains are assembled from genuine ACCOLOY KUPLEX component parts which have been factory proof-tested at twice their specified load limits. Each part is designed and manufactured specifically for use with all other parts of the complete KUPLEX sling assembly. These matched components are made to ACCO *Registered* Specifications from heat treated ACCOLOY steel, and are engineered to be as strong as the chain itself. Hooks and Kuplers are magnaflux-tested. In addition, you are assured of complete safety—with genuine component parts—by a **CERTIFICATE OF TEST** issued by ACCO and signed by the distributor with each complete sling purchase.

• • •

Write our York, Pa., office for the name of the Authorized Kuplex Sling Distributor nearest to you.

Accoloy Shaped Master Link

Drop Forged Accoloy KUPLEX Hook (magnaflux tested)

Drop Forged Accoloy Kupler (magnaflux tested)

Accoloy 125 Chain

• A nearby Authorized ACCOLOY KUPLEX Sling Distributor will supply promptly from stock the exact sling chains you need. With the 4 components shown above he can make up single, double, 3-leg and 4-leg slings in six different chain sizes (¼" through ⅞").

Accoloy Kuplex Sling Chains

American Chain Division • American Chain & Cable Company, Inc.

Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston
*Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

*Indicates Warehouse Stocks

ACCO

FOR QUALITY... PRODUCTIVITY ... PROFIT

INTEGRATED AUTOMATION BY GENERAL ELECTRIC

G. R. BROWN, Manager of General Electric's Metal Rolling and Processing Sales, talks about new automation capabilities at General Electric.

Integrated Automation

"General Electric is ready now to assist you with the ultimate in automation . . . automation of your entire plant."

To date, General Electric has concentrated on the complex problems of automating your individual processes. Now, with actual installations completed, individual-process automation has become a reality. General Electric has now taken the next logical step in sound automation planning.

With newly developed products and system technology, General Electric engineers can now link your "islands of automation" to provide complete automation of an entire production area.

With this major phase of your automation program complete, it then becomes possible to link automated production areas by means of a master computer-control system, thus providing completely integrated automation of the entire plant.

Based on a step-by-step modernization approach, General Electric's plan provides flexibility for technological and economic developments in your company. At the same time, it enables you to begin now, taking advantage of the many benefits of automation.

For example, the first step in integrated automation has already been taken by many metal producers. New rolling mills automated by General Electric are automatically keeping strip "on gage" to minimize scrap and boost yield. Primary rolling costs are being reduced through application of G-E programming and

means effective control of your entire plant

computer systems. G-E automated systems will eliminate charging errors in many blast furnace operations, increasing furnace profits. In many mill operations, G-E automated systems are making available, immediately, critical data in the most usable form to permit wise and timely management decisions resulting in improved and more consistent product quality, reduced operating costs and optimum utilization of the mill.

The next step for many of these metal producers will be the linking together of "islands of automation." By application of General Electric automatic computer-control equipment, greatly improved programming for an entire sequence of processes will result. All operations can then be effectively measured and evaluated early enough to allow modifications that will quickly satisfy conditions in any individual process. An entire production area will become responsive to directives originating from a central source.

Finally, as production areas are linked by a master computer-control system, completely automatic production scheduling and manufacturing throughout the entire plant will result. Over-all performance will be in direct accord with management decisions based on incoming orders, related process operations, materials inventories and all of the many complex variables that determine profitable plant operation.

Let General Electric begin working with you now in your planning for future profits. You'll find that the capability to provide the ultimate in automation is a reality at General Electric today. For more details, call your nearest Apparatus Sales Office. General Electric Company, Section 659-131, Schenectady 5, New York.

AUTOMATION THROUGH MODERNIZATION

GENERAL ELECTRIC

Every Worker

breathes easily when He Wears the AO "RED DEVIL" Respirator

NOTE: The Red Devil Filter is *red* in color and is an American Optical exclusive. Available in packages of 5 or 50.

Workers like the equipment because it's so easy to breathe through. The compact variable density Red Devil filter is extremely efficient. Safety budget dollars stretch farther because the respirator has a built-in pre-filter which lengthens service life.

The Red Devil illustrated is one of AO's inventory-reducing R2000 Single Filter Respirators offering 9 types of protection with one basic face piece. The R2090 Red Devil Respirator is approved by the Bureau of Mines for all dusts not significantly more toxic than lead, pneumoconiosis-producing mists and chromic acid mist.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS

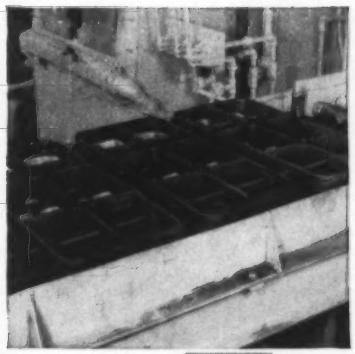
Safety Service Centers in Principal Cities
Always insist on Trade-marked Safety Products

Protect Face and Respiratory Passages with this Combination

This Special Face Shield

of clear acetate easily attaches to the respirator for protection of eyes and upper face against flying particles. Shield is light and comfortable — can be worn over prescription glasses.
Catalog number is AO R-18.

Your surest protection...AO SURE GUARD Products



1 HOM, a new alloy developed by Duraloy metallurgists and capable of retaining high working strength at temperatures up to 2200°F, with limited application at 2300°F. The alloy is applicable for all types of castings: static, centrifugal, shell-molded.

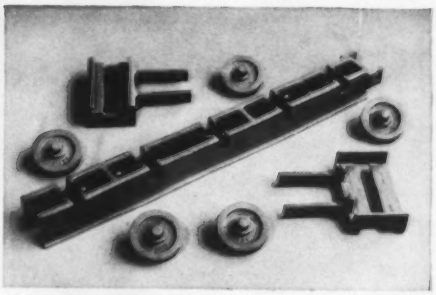
2 Shell-molded castings for meeting close and rigid tolerance limits; post-casting machining or other finishing practically eliminated; low mass production costs.

Illustrating 4 of Duraloy's Major Casting Services

If the casting used in your equipment has to meet high temperature (anything up to 2300°F) and/or corrosion, why not discuss your requirements with our metallurgical staff? Our company can call upon more than 35 years of experience in this exacting business of high alloy castings. In the meanwhile, if you would like to have a copy of our latest catalog, write or call our nearest office.

3 Centrifugal castings which produce a denser, more uniform metal approaching forged metal strength.

4 Static castings which can be produced in weights ranging from a few ounces to single castings 7 tons and heavier; wide range of alloying combinations, including the new HOM referred to above.



Note

As a point of interest, all of the castings shown here were produced for Lindberg Engineering Company, Chicago, for incorporation in heat-treating and annealing equipment sold by that company. The centrifugally cast tube for the generator, trays, and rollers for the furnace rails are cast of HOM. The rails and rail supports for the furnace are statically cast of 35-15 alloy.

ALLOY CASTING INSTITUTE ACI MEMBER

The DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.
EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

NATCO
B
A

From one pushbutton station, the line operates as a single unit, but each machining element has its own controls for independent operation.

A "medium" production transfer line like this can be built by adding as little as 12½ per cent to the cost of the individual machines.

New Convertible Transfer Line Trims Costs of "Medium" Production

By linking four standard Natco multiple-spindle drilling machines with transfer devices, Caterpillar Tractor Co., Peoria, Ill., has substantially reduced the cost of drilling and reaming diesel cylinder blocks. The transfer line incorporates three standard Natco 2-way machines and one vertical C4B.

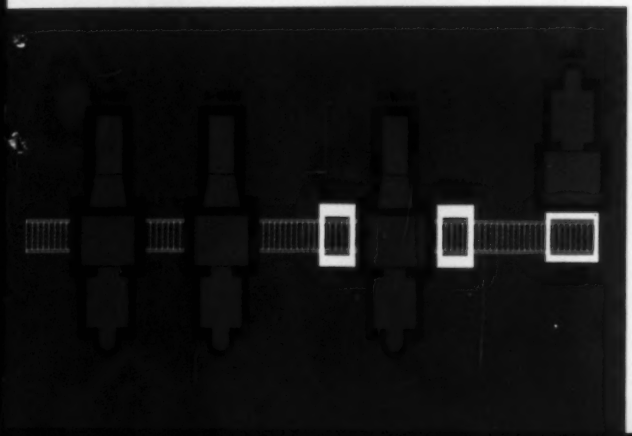
Each machining unit is self-contained with its own hydraulic and electrical system. Machine units can be interchanged or removed from the line for independent operation. Transfer links are standard Natco types.

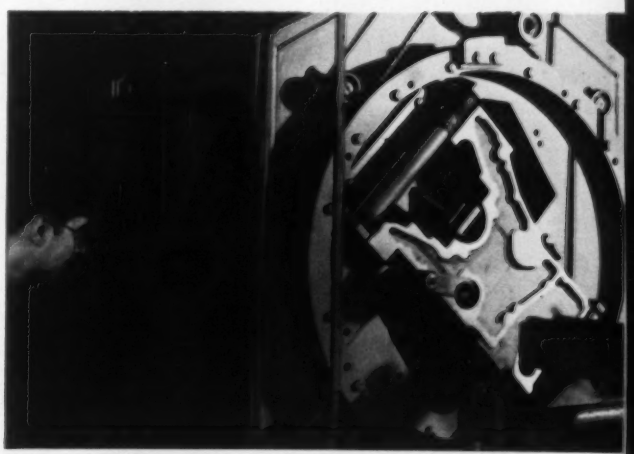
Take advantage of this new approach to "medium" volume production by calling your Natco representative. Write for bulletin No. 100.

NATCO

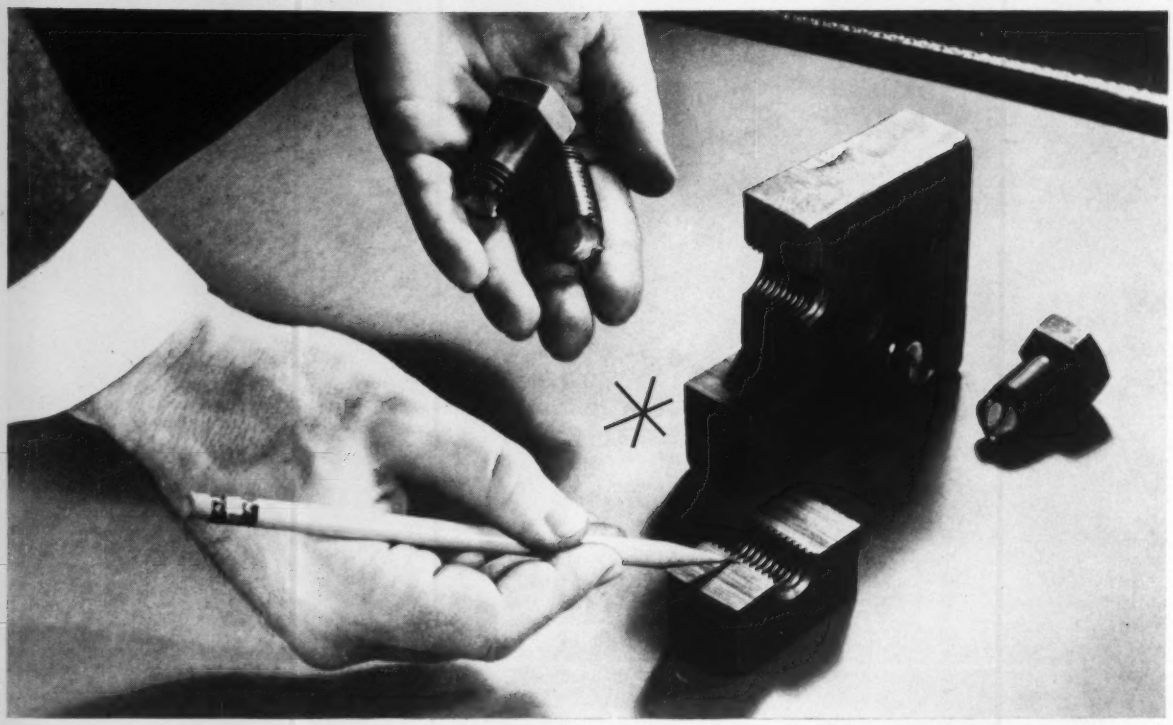
The National Automatic Tool Company, Inc., Richmond, Indiana

Rollover, shuttlebar, and walking beam transfer devices link the various machining units of this unusual line.





Rollover device repositions cylinder block. Other Natco transfer devices resolve the loading differences between machining units, providing both in-line and cross-line motion.



Showed way to save $7800

RB&W fastener survey of refrigeration unit suggested that hex screws be substituted for studs ... and castings be tapped with less costly clearance fit.

When there are no special design requirements or space clearance conditions, using studs of 1-inch diameter and smaller often penalizes the user needlessly. First, in direct costs, since the more economical *hex screws* will do the job. Second, in production costs, since studs require holes tapped with an expensive *interference* thread fit.

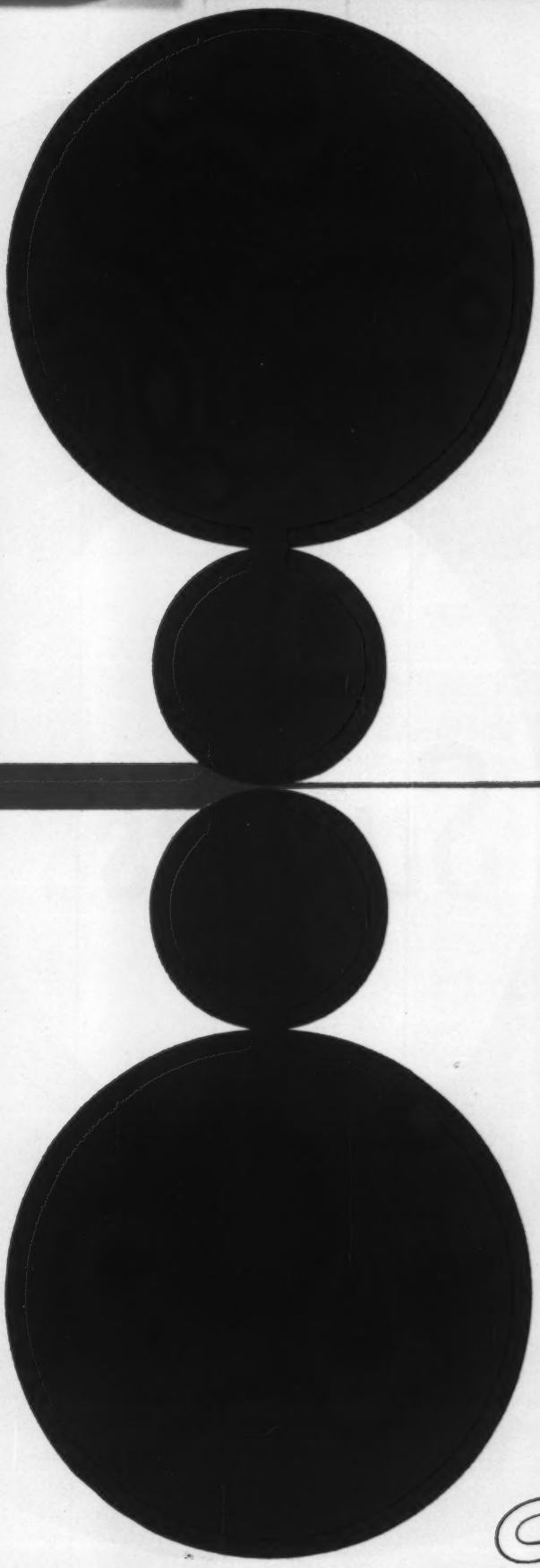
The RB&W Man pointed this out when his survey revealed over 250 stud fastenings per refrigeration unit. For this application, 250 hex screws cost $8.45 . . . for a saving of better than $22 over the studs and nuts. Annually this would total to $7800 . . . *clear profit.* And on top of this, reduced tapping costs, too.

Want to get the most from *your* fastener dollars? Ask for an RB&W man to make a survey. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

R B&W
115th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.

** Specifying studs for fear that hex screws might damage castings during disassemblies is based on a groundless fear. Hex screws in threaded holes with clearance fit can be reused repeatedly without damaging the casting. In the test casting shown above, the hex screws were first tightened and removed 50 times—then torqued to breaking point. Cutaway section showed casting threads were still perfect, with no sign of stripping.*



High production, key to steel prosperity, rolls on lubricants. Ironsides can help you lick its new problems.

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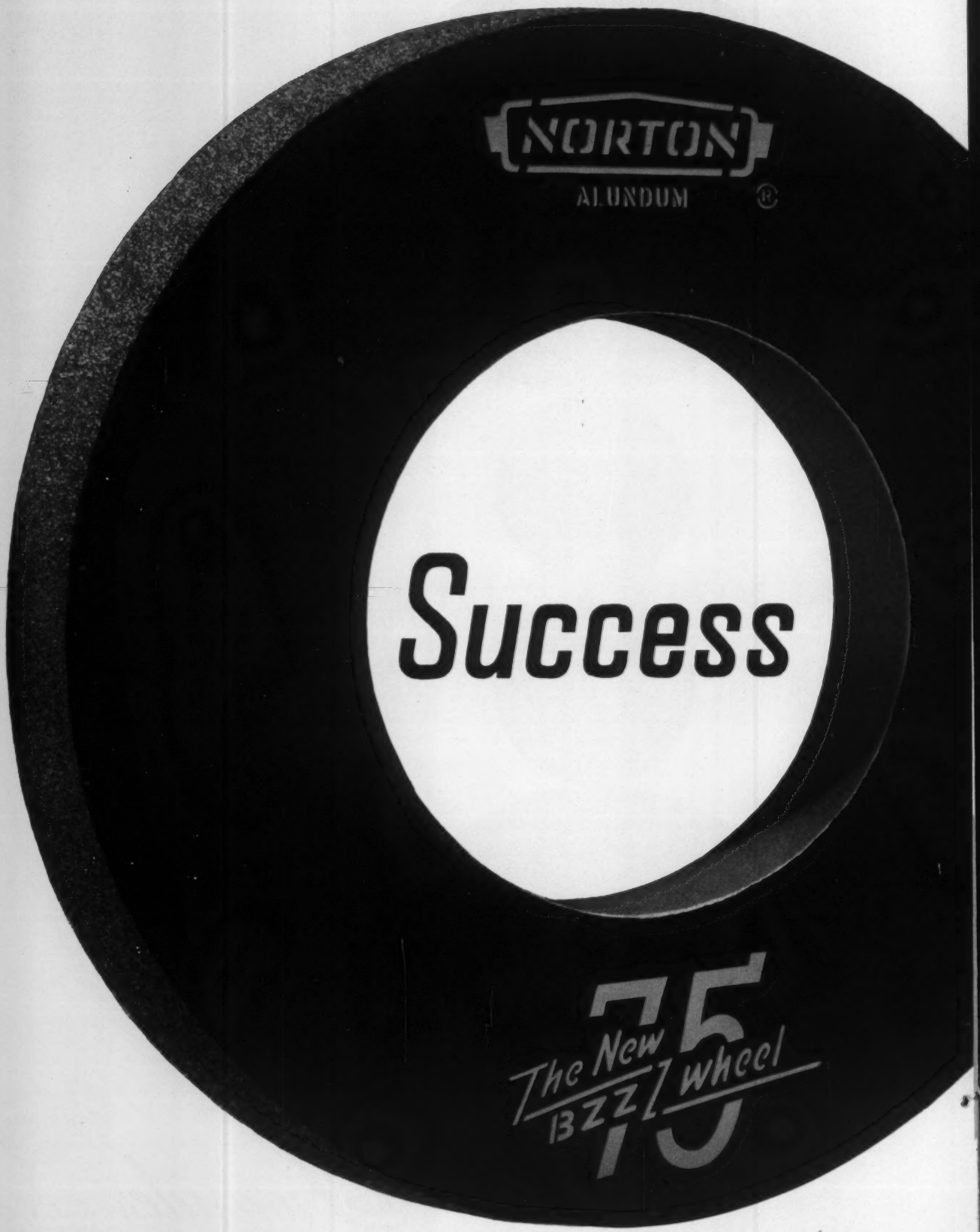
For tailor-made roll oils, address The Ironsides Company, Columbus 16, Ohio, Makers of Palmoshield


NORTON
ALUNDUM ®
Success
The New
BZZ
wheel
75

From Norton Research

75 ALUNDUM®

A new abrasive for stainless steel grinding that thrives on greater pressure and faster speeds.

We've done it — and on our 75th Anniversary, too! The wheel you see on the opposite page is a major breakthrough in stainless steel slab and billet grinding. It's our new 75 BZZ wheel.

Until now, the greater pressures and higher speeds of the newer automatic grinding machines have not been fully utilized with more conventional wheels. Now Norton offers you the 75 BZZ, a wheel specifically developed to take *full production* advantage of these machines.

Norton 75 ALUNDUM abrasive is a tougher, more durable material, indicated by extensive laboratory and initial field tests. These tests show that 75 ALUNDUM BZZ wheels remove twice as much metal and reduce the total cost per pound of metal removed by as much as 40%. Fast rate of cut . . . longer wheel life explain this performance.

That's the success story of Norton 75 ALUNDUM abrasive — one of the greatest single contributions ever made to grinding wheels used for stainless steel grinding. Contact the nearest Norton office or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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ABRASIVES

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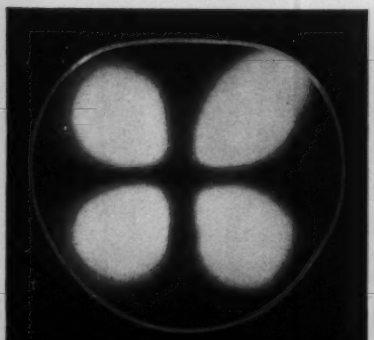
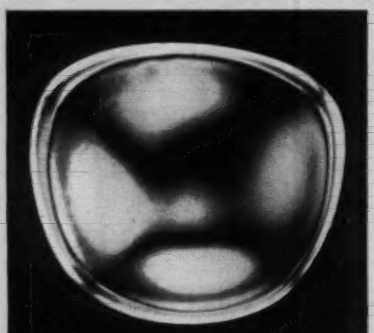
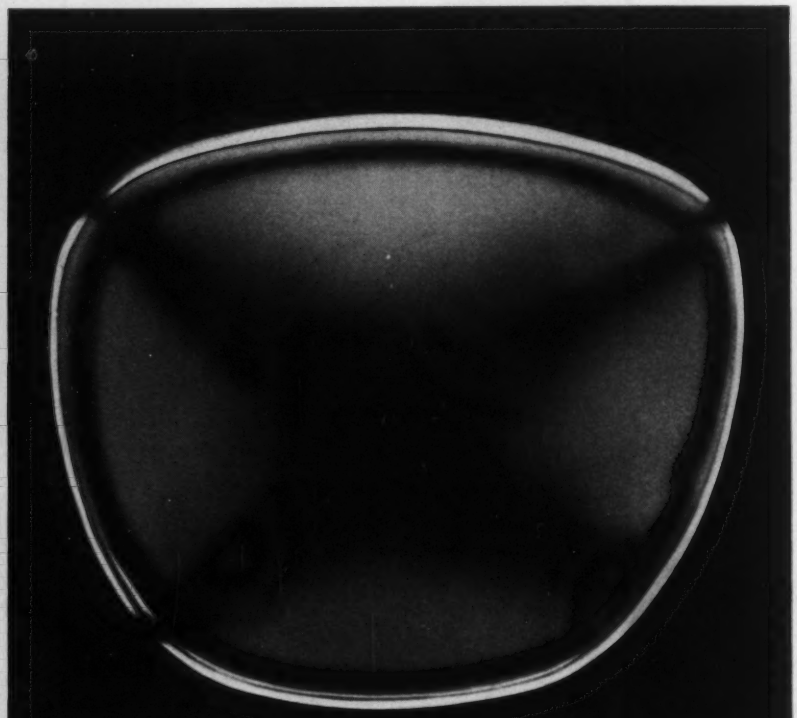


How good a test is the lens pattern? This "Maltese cross" tells only that the heated lens was center-quenched.



In B&L Bal-SAFE prescription safety lenses, at least 6 times stronger than the standard, patterns vary with each prescription.



Rather than patterns, look for this dark line running parallel to the lens edge; it's assurance of the extra safety margin in Bal-SAFE Safety Lenses.

What patterns don't tell about Rx safety lenses

Remember when the cross pattern, seen in the polariscope, was the hallmark of impact resistance in safety lenses? Now, of course, we know this pattern proves only that the lens has been heat-treated and center-quenched. It tells nothing about how safe . . . or unsafe . . . the lens is.

Using an exclusive new process that quenches the entire lens surface at once, Bausch & Lomb has increased impact resistance at least six times that of the accepted safety standard. But the cross pattern has practically vanished! And in Bal-SAFE Rx lenses the pattern has become a scramble that varies with the prescription.

You can't measure the *safety* of a lens by its cross pattern. Of much more importance, for example, is the peripheral dark line you see in all Bausch & Lomb Bal-SAFE Safety Lenses (Figures 2 and 3 above). It tells you the entire edge of the lens—as well as front and back surface—is in compression, thus increasing by several times its resistance to impact and thermal shock.

As you well know, vision hazards are nothing to be taken casually. There's too much at stake. You play it safest when you insist on B&L Bal-SAFE Safety Lenses—the safety lenses with the vast *extra* margin of protection. They cost no more than others. Want to know more about them? Call your B&L supplier or drop a line to: Bausch & Lomb, 98505 Lomb Park, Rochester 2, N. Y.

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protection + economy + worker acceptance

This unusual part for BUNN Package Tying Machines is typical of the many shapes and sizes forged by WILLIAMS, weighing from a few ounces up to 250 pounds.

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develop maximum strength, super toughness even in complex parts like this

Williams proved that a properly designed forging was the best method to produce this complex part for B. H. Bunn Company, Chicago, Ill., manufacturers of package tying machines. We make many other complicated Bunn parts to tolerances that require little or no machining. They are all designed for rugged performance under constant stress. Not one has failed yet!

The basis for *strength* and *toughness* in forgings requires the proper determination and control of flow characteristics of the metal used. Here at Williams we call it Forging Design Development. Coupled with skilled forging techniques, we produce many special jobs others say "can't be done."

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New DoALL Automatic Power Saw Delivers Cutting Accuracy Beyond Compare

Unequaled indexing accuracy and precision cutting are demonstrated by this DoALL automatic power saw. The material: Hot rolled tubing (AISI 3310) pickled, 7.109 in. o.d. with walls .856 in. thick. The cutting "team": A DoALL model C-68 automatic power saw using Demon® h.s.s. saw band and DoALL No. 240 cutting oil.

In all, 192 slices were made—*every one well within flatness tolerance of .014 in.* A total of 3,192 sq. in. was cut with a single saw band—without reconditioning of any kind. The cutting rate was 4.26 min./cut. This remarkable performance proves again that you get the highest productivity with the unbeatable DoALL combination of machine—plus blade—plus coolant.

To users of power sawing equipment these advances mean important new economies in all kinds of cut-off work. Increased cutting rates give you more cuts per hour. Greater accuracy saves time on machining operations.

Call your local DoALL store today and ask a DoALL Sawing Specialist for advice on your own work. He will gladly arrange an in-plant demonstration. There is no cost or obligation.

PS-15

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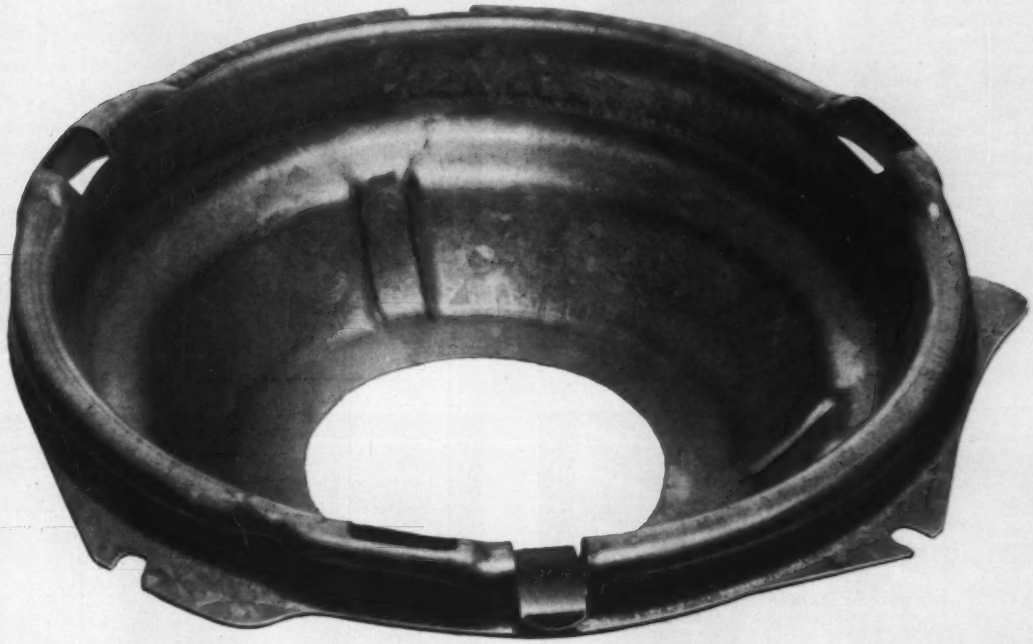
The DoALL Company, Des Plaines, Illinois

Better products through better methods and steels



(or how zinc-coated steel cut 5 steps from auto lamp housing fabrication). When automotive head and tail lamp housings were drawn from cold rolled sheet steel and then zinc-plated or painted, as many as five or six handling and cleaning steps were required to make them corrosion-resistant. Now, fabricated from Weirkote continuous-process zinc-coated steel, the housings go directly from the press to the assembly line. Further processing is unnecessary because Weirkote can be worked to the limits of the steel itself without chipping or flaking its corrosion-resistant zinc surface. It's this superiority that caused the automobile industry to increase its consumption of zinc-coated steel more than 700% in five years; to use it in such varied applications as mufflers, window channels and the understructures of unitized bodies; to take

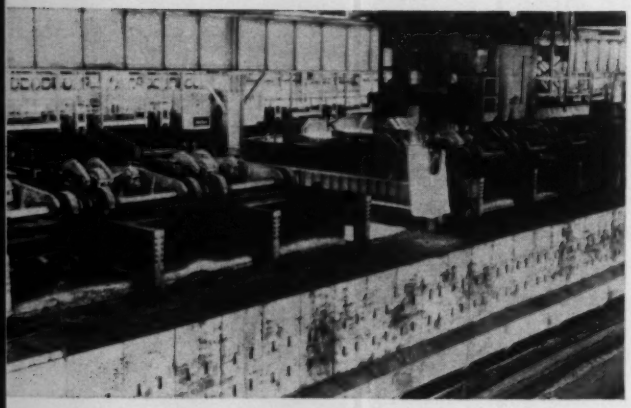
advantage of developments such as differentially zinc-coated steel that can be welded at top production-line speeds. A major supplier is Weirton Steel Company—producer of Weirkote continuous-process zinc-coated steel and many other fine steels that improve products, methods and profits throughout industry.

WEIRTON STEEL
Weirton, West Virginia

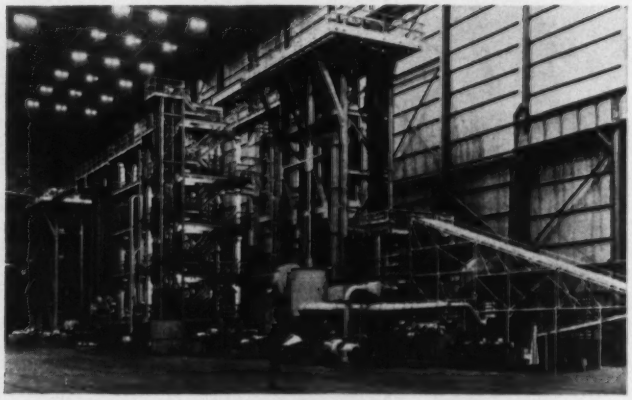
WEIRTON STEEL COMPANY

Weirton Steel is a division of **NATIONAL STEEL CORPORATION**

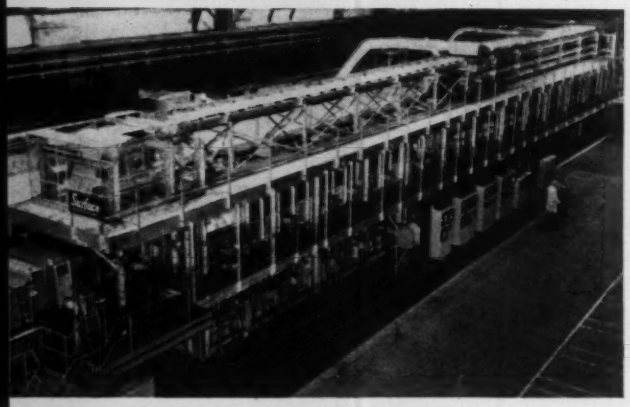
Weirkote will also be available in 1961 from National's Midwest Steel Division, Portage, Indiana.



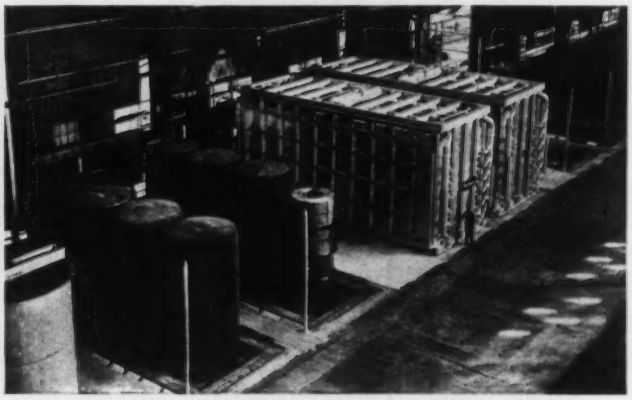
48 soaking pits installed at one time.



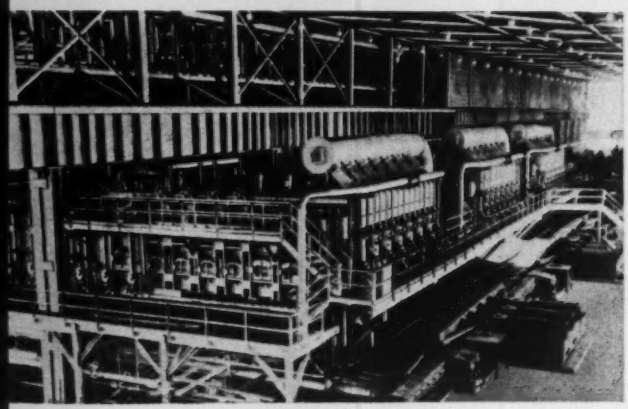
Continuous tin plate annealing line.



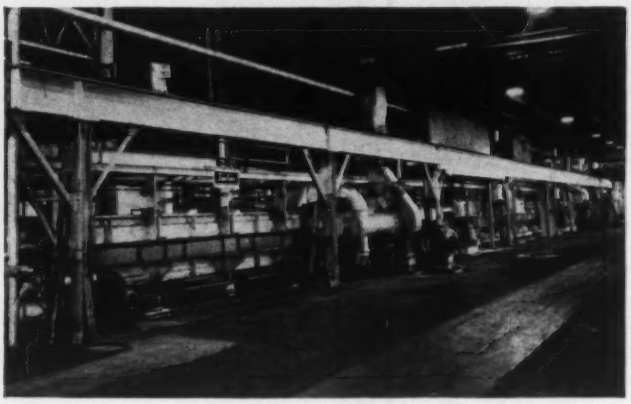
Normalizing line for enameling strip.



Multiple-stand annealing covers.



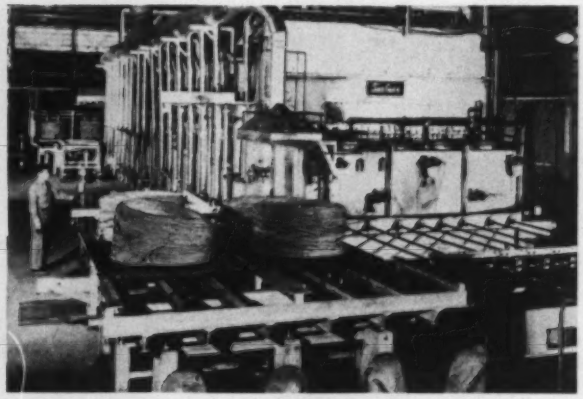
World's largest slab-heating furnaces.



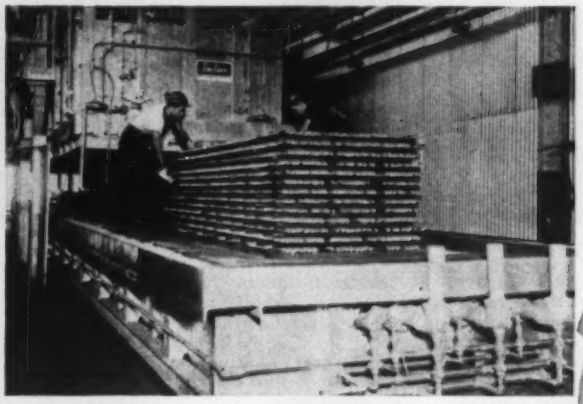
Continuous strip galvanizing line.

Worldwide engineering and manufacturing facilities through associates in Australia

Single-stand radiant tube annealers.



Annealing, carbon restoration furnace.



Car-bottom rod and bar furnace.

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for steel profits

Surface Combustion's proving grounds—a few of which are shown at the left—include virtually every rolling mill in North America plus a considerable number abroad.

You can sample here the variety of Surface equipment which has passed the toughest tests on the steel mill floor: checked out for quality, shaken down for reliability, and—most important to you—proved out for profitability.

With internal costs and external competition on the rise, it will pay you more than ever before to specify the services and equipment of a company which has repeatedly passed the tests in steelmaking's ultimate proving grounds. Surface Combustion, 2402 Dorr Street, Toledo 1, Ohio.

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HOUR OF DECISION

After hours? — sure You're not surprised at that because you know it's when he (and probably you, too) concentrates on the problems which are vital to his company's continued successful growth. The day is filled with production crises, maintenance problems, personnel questions, and committee meetings. It's only now that he can really study the facts and decide what's best.

Right now he's reviewing his machine tool inventory. He's amazed at how old some of his equipment is getting to be. It seems only yesterday that he signed the purchase order for it to increase his capacity for World War II. But that was 1943, seventeen years ago! No wonder maintenance is getting high and efficiency is dropping off.

We've got a suggestion for this man (and for you, too). Attend THE MACHINE TOOL EXPOSITION — 1960 and see for yourself why Modern Machine Tools = Production Efficiency. This exhibit, the first since 1955, is sponsored by The National Machine Tool Builders' Association* and will contain eleven acres of the U.S.A.'s newest machine tools under power, cutting and forming metal to demonstrate 1001 ways to lower production costs. Can you afford to stay home?

You're also invited to the PRODUCTION ENGINEERING SHOW on the Navy Pier.

No extra registration needed.

*The N.M.T.B.A. represents 90% of the U.S.A. machine tool industry.

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International Amphitheatre
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THE MACHINE TOOL EXPOSITION — 1960

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A RADICALLY NEW METALLURGICAL APPROACH builds unprecendented durability into Heller "Ultras". That's why they're certain to outlast all high speed steel band saws currently used in production cut-off work on ferrous metals. **IMPROVED IN EVERY WAY!** Special steel analysis . . . more advanced production methods . . . closer heat-treating control . . . stronger welds . . . more exacting 100% inspection! No wonder Heller "Ultras" deliver up to 300% more cuts per blade. Yet, the price is only 10% higher. This means as much as 75% savings in cutting costs.

TESTS CONFIRM THEIR SUPERIORITY! Matched against all comers, at heavy feeds and higher speeds, the harder teeth, tougher bodies and more uniform full-blade flexibility of Heller "Ultras" are sure bets to win the race against time and costs. Seeing's believing!

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HIGH SPEED STEEL
metal cutting
BAND SAWS

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TAKE THE GAMBLE OUT OF BUYING!

An early order for welded-to-length, protectively packaged Heller Ultra High Speed Steel Band Saws from your nearby Heller Distributor is the wisest and safest bet you'll ever make. Prompt delivery is also guaranteed!

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America's Oldest File Manufacturer
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Subsidiary of Simonds Saw and Steel Co.

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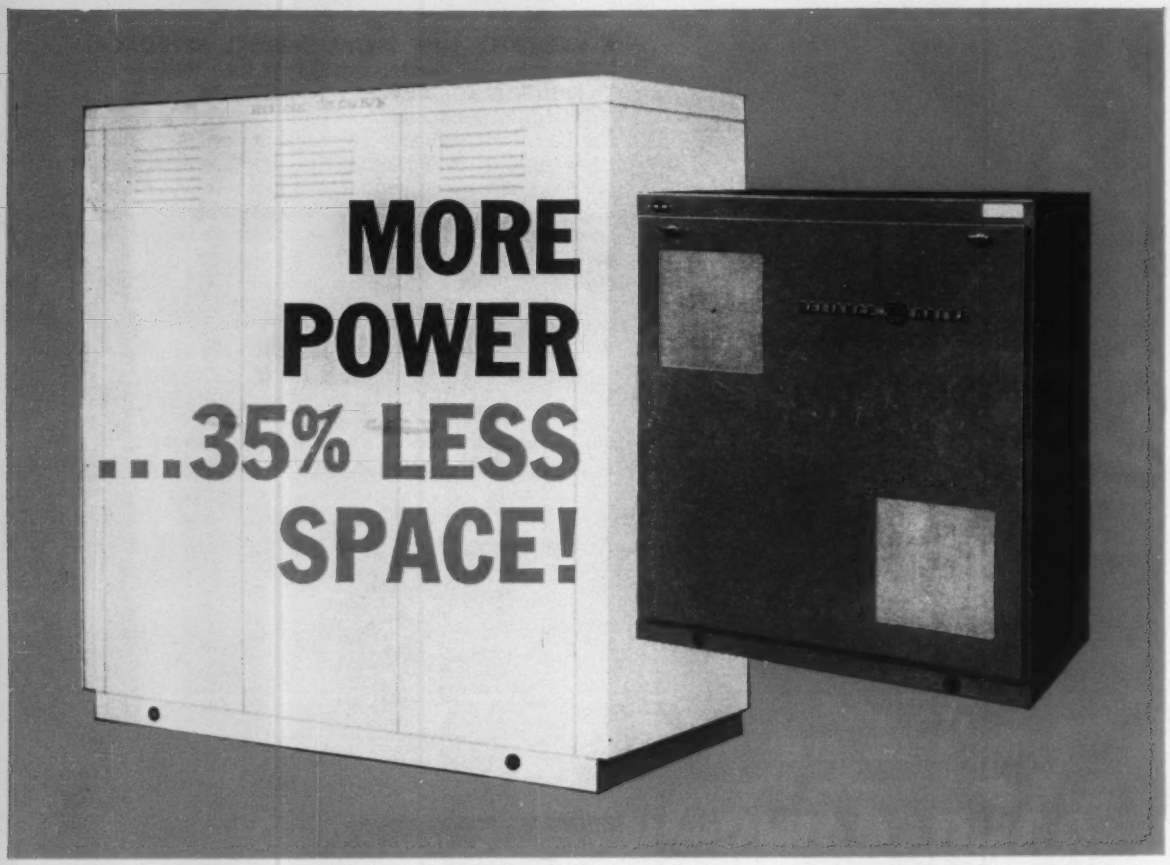
Reliance Super 'T' V★S Drives



Both of these control units are rated at 50 horsepower! Actually, the new, small Super 'T' V★S cabinet packs more punch!

LIKE the Reliance Super 'T' Drive Motor, new V★S power units utilize Class B insulation, permitting a more compact unit. 100% overloads of one minute duration are accomplished without failure! Advanced design of ventilation keeps control and power units cooler . . . another reason why smaller size is possible. And service life is substantially extended.

Matched system design of drive motor, power unit and controls produces a highly efficient, integrated drive—to give you a wide range of stepless, variable operating speeds from a-c. circuits.

Super 'T' V★S Drives are available for immediate delivery. Check your Reliance salesman for delivery schedules on the full line, 1—350 hp., Bulletin Number D-2506, has been prepared to give you complete information. Write for it. D-1641

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

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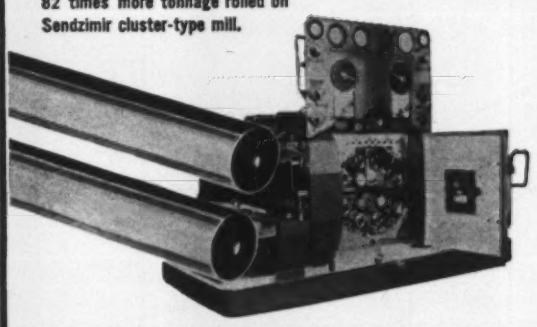
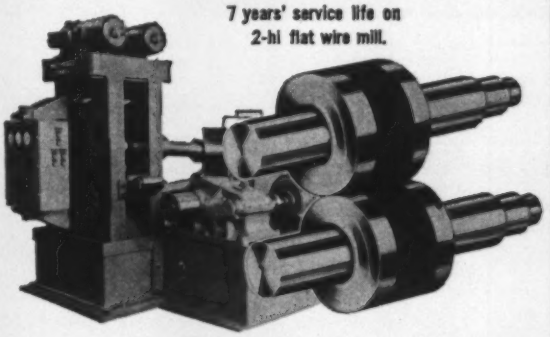
. . . ANOTHER TALIDE CASE HISTORY

20 YEARS' SERVICE WITH Talide® ROLLS at Jones & Laughlin Steel

82 times more tonnage rolled on Sendzimir cluster-type mill.



7 years' service life on 2-hi flat wire mill.



The Youngstown, Ohio plant of JONES & LAUGHLIN STEEL CORPORATION'S STAINLESS AND STRIP DIVISION (formerly Cold Metal Products Co.) reports that the TALIDE (Tungsten Carbide) work rolls used on their 4-hi cold rolling mills give INCREASED PRODUCTION, LONG SERVICE, FINE FINISH AND EXTREMELY CLOSE TOLERANCE. Over 25 pairs have been purchased during the past 20-year period —many of which are still in operation producing high quality strip steel of all analyses.

Metal Carbides pioneered and developed the original installations of tungsten carbide rolls and has successfully adapted them to all types of rolling mills including STECKEL, BLISS, UNITED, MESTA, STANAT, SENDZIMIR, WATERBURY-FARREL, TORRINGTON, RUESCH, FENN, WEAN, COLD METAL, LOMA, LOCKWOOD, TAYLOR, etc.

Talide work rolls are ultra-hard, extremely dense and porous-free. Strip steel and non-ferrous metals of all analyses are rolled down to thinner gauge, with more accuracy, greater reductions and with fewer anneals than possible with any other roll.

ONLY TALIDE WORK ROLLS GUARANTEE THESE ADVANTAGES

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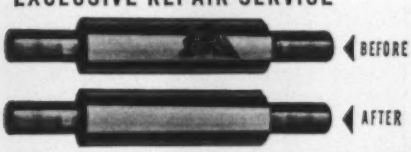
- ★ IMPROVED PHYSICALS
- ★ BETTER FINISH
- ★ GREATER REDUCTION
- ★ LONGER LIFE
- ★ LESS DOWN TIME
- ★ HIGHER SPEEDS
- ★ FEWER REJECTS
- ★ CLOSER TOLERANCE
- ★ LESS MAINTENANCE

EXCLUSIVE REPAIR SERVICE



Broken or damaged carbide rolls can be reworked to first-class condition with all defects eliminated at one-half original cost. Only Metal Carbides offers this service—because of its exclusive hot press method.

Talide Rolls are made in lengths up to 100" diameters up to 25", and up to 5000 lbs. by weight.

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Send for new 16-page catalog CR-59

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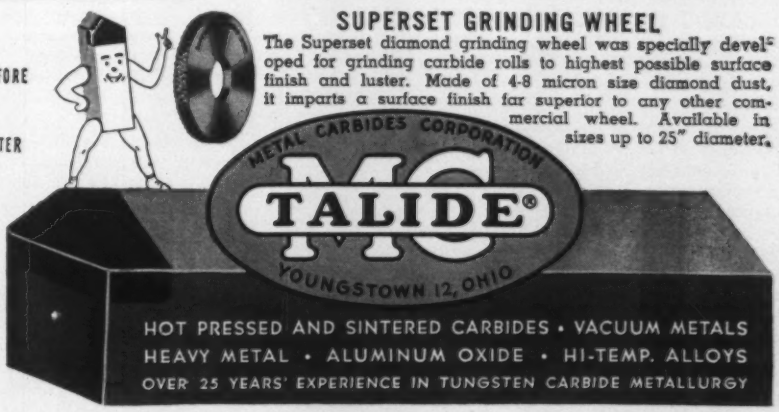
The Superset diamond grinding wheel was specially developed for grinding carbide rolls to highest possible surface finish and luster. Made of 4-8 micron size diamond dust, it imparts a surface finish far superior to any other commercial wheel. Available in sizes up to 25" diameter.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OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

NO. 4 OF A SERIES

"How to Design Welded Aluminum Structures"

Composite Stress-Strain Curve Provides More Realistic Design of Welded Aluminum in Compression

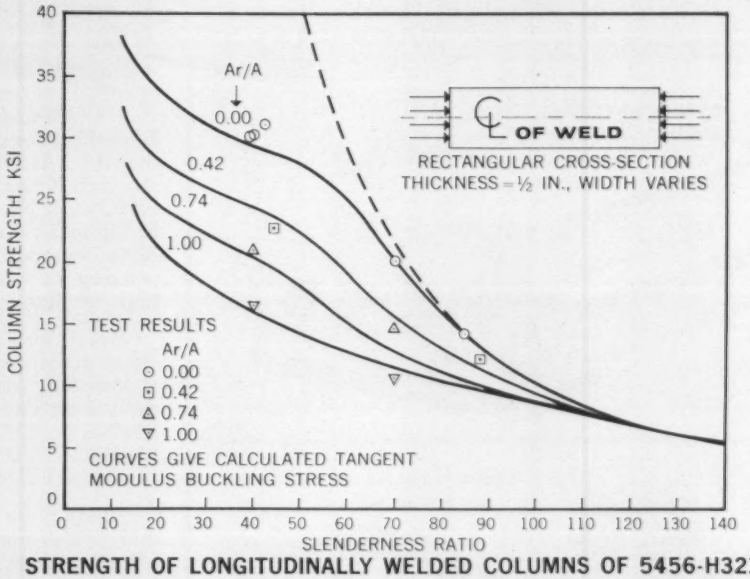
Mr. Harry N. Hill, *Engineering Design Division Chief, Alcoa Research Laboratories, Aluminum Company of America, reports findings presented at the 1959 annual meeting of the American Society of Civil Engineers.*

In determining the strength of welded compression members, the design concepts discussed in earlier Alcoa articles on "reduced-strength zone" and "10-in. gage length yield strength" are used. Just as with tension members, the strength of a welded compression member depends on the location and extent of the welds.

Strength of columns or compression members at stresses above the proportional limit of the material is greatly influenced by the shape of the stress-strain curve. Tests at the Alcoa Research Laboratories years ago demonstrated that use of the "tangent modulus" in the column strength formula gives calculated strengths that agree closely with actual test results. The tangent modulus method for calculating column strengths is now quite widely accepted.

The strength of a column with several pieces joined by longitudinal welds is controlled by the dimensions of the member and the stress-strain relation for the complete cross section. The stress-strain relation can be constructed as a composite curve of the heat-affected material in the reduced-strength zone and the material in the remainder of the cross section. Strength of the column can then be computed by the tangent modulus method, using this composite stress-strain curve. A family of column strength curves with different values of A_r/A, similar to those shown in the accompanying chart, are useful in designing.

The chart shows the reliability of this method of calculation when applied to column specimens composed of two pieces of ½-in.-thick 5456-H321 plate joined by a longitudinal butt weld. Several widths of plate were used to give different ratios of reduced-strength area (A_r) to total cross-sectional area (A).



STRENGTH OF LONGITUDINALLY WELDED COLUMNS OF 5456-H321

Use of the composite stress-strain curve and the tangent modulus method indicates that most welded aluminum members under compression are *not* limited by the properties of the material in and adjacent to the weld. In fact, specimens with over 40 per cent of the cross section in the reduced-strength zone developed strengths more than *50 per cent greater* than those representative of the material adjacent to the weld ($A_r/A = 1.00$).

Strength of a column with transverse or other localized welds *can* be calculated with principles applicable to columns of varying cross section. However, the method is too laborious for most ordinary design procedures. Simplified techniques suitable for design are described in the ASCE paper *Designing Welded Aluminum Structures.*

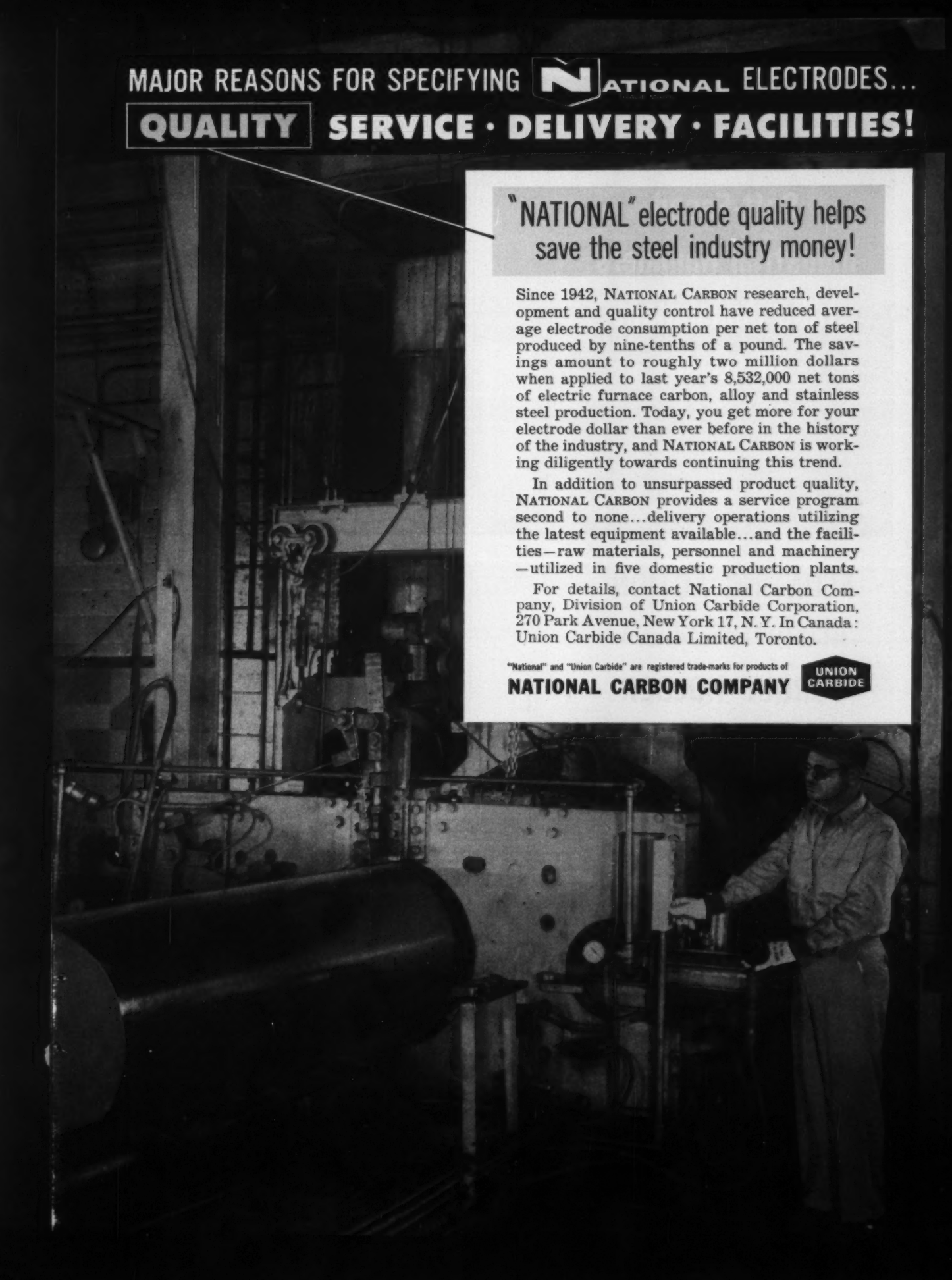
Welds confined to the end of a pin-ended column have negligible effect on the strength of the member except to limit the maximum stress for a very short column to the 10-in. gage length yield strength of the welded region. Even columns with transverse welds at mid-length have surprisingly high strengths, if the length of the reduced-strength region is small compared to the column length.

Future articles in this series of design concepts will feature strength of welded beams, fillet welds and design data.

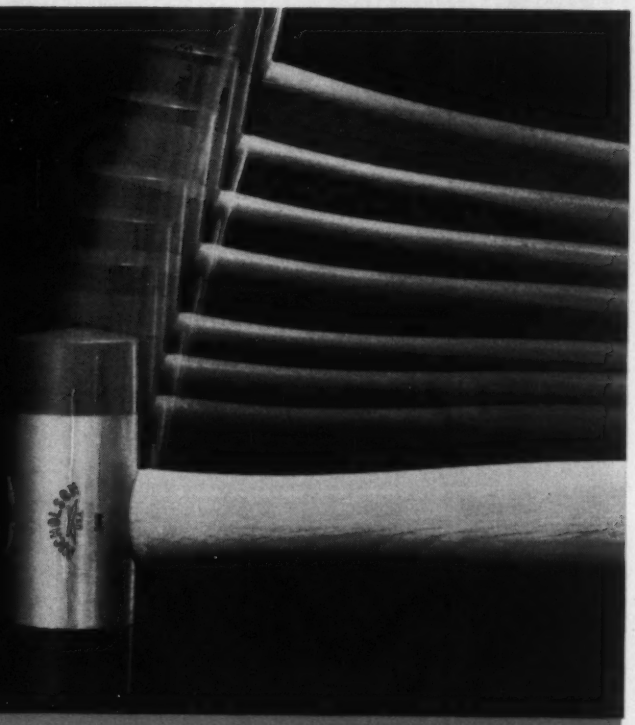
For top-quality aluminum welding products such as consumable electrodes, welding and brazing rods and fluxes, and solder and soldering fluxes, contact your nearest Alcoa sales office. For more complete information on *Designing Welded Aluminum Structures*, write Aluminum Company of America, 1761-E Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

WELDING MATERIALS

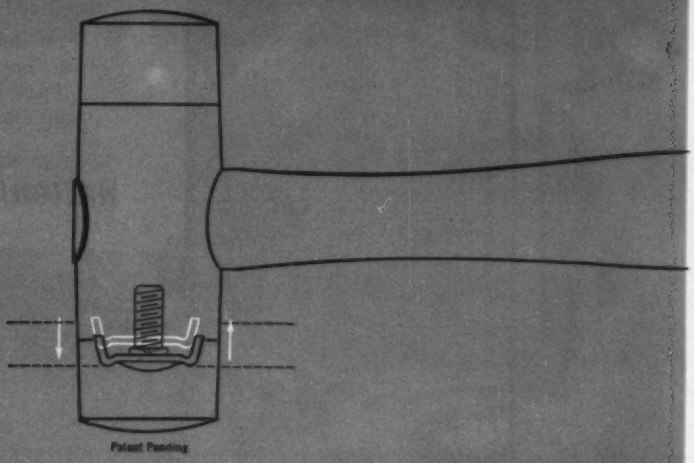

MAJOR REASONS FOR SPECIFYING NATIONAL ELECTRODES...
QUALITY SERVICE · DELIVERY · FACILITIES!
"NATIONAL" electrode quality helps save the steel industry money!
Since 1942, NATIONAL CARBON research, development and quality control have reduced average electrode consumption per net ton of steel produced by nine-tenths of a pound. The savings amount to roughly two million dollars when applied to last year's 8,532,000 net tons of electric furnace carbon, alloy and stainless steel production. Today, you get more for your electrode dollar than ever before in the history of the industry, and NATIONAL CARBON is working diligently towards continuing this trend.
In addition to unsurpassed product quality, NATIONAL CARBON provides a service program second to none...delivery operations utilizing the latest equipment available...and the facilities—raw materials, personnel and machinery—utilized in five domestic production plants.
For details, contact National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.
"National" and "Union Carbide" are registered trade-marks for products of
NATIONAL CARBON COMPANY
UNION CARBIDE

Nicholson Soft-Faced Industrial Hammers take punishment in stride



FLOATING ACTION dissipates shock

TORQUE HOLDER prevents head from twisting during impact



Nicholson research and engineering pay off for you in this entirely new type of industrial hammer. It features a two-piece torque washer and stud. Here's how it works. At the point of impact, the torque washer rides freely up and down on the stud. The percussion of the hammer blow is absorbed and dissipated by this "floating action." This built-in shock-absorbing action reduces fatigue on the part of the worker.

The four gripping prongs of the torque washer are securely imbedded in the head. This prevents twisting during impact, increases productivity and worker safety.

Try this new principle in industrial hammers. It will meet your most demanding requirements. You'll see and feel the difference that Nicholson development and engineering have created.

* **Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.**

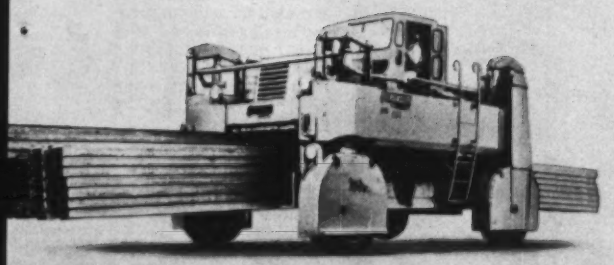
NICHOLSON

NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND

FILES • ROTARY BURS • HACKSAW AND BAND SAW BLADES
GROUND FLAT STOCK • INDUSTRIAL HAMMERS

TOWMOTOR-GERLINGER

offers you three complete capital-saving services!



1 YOU LEASE *without down payment!*

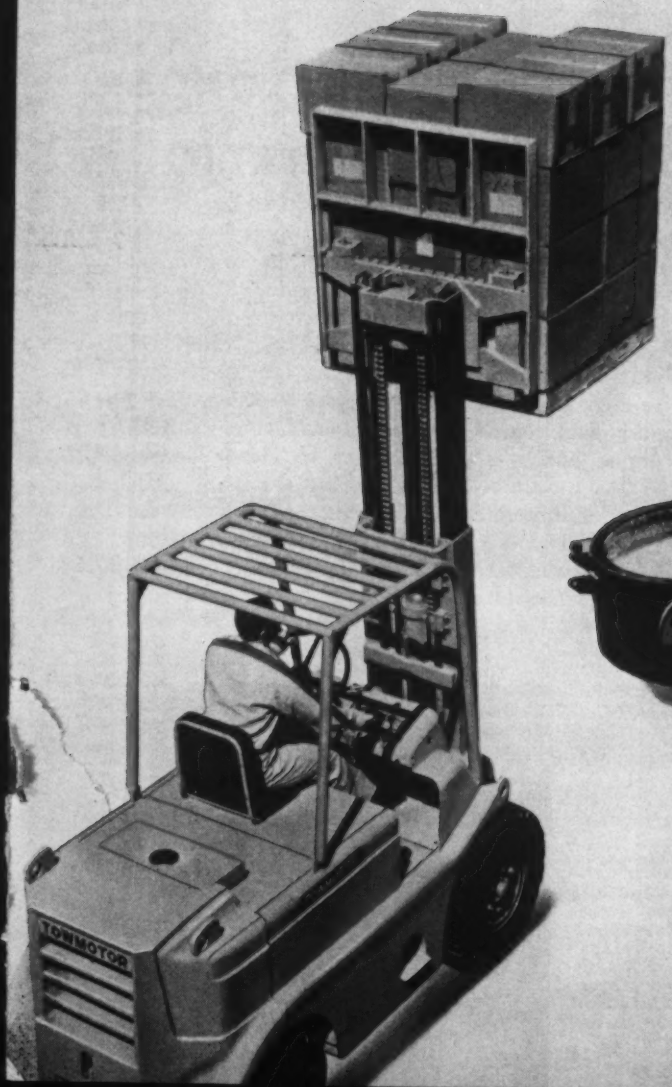
You don't make a *down payment* when you use the Towmotor-Gerlinger Lease-A-Truck Plan. You put T-G equipment to work on a continuous, year-'round basis. You just make a small monthly payment—paid out of savings the equipment produces.

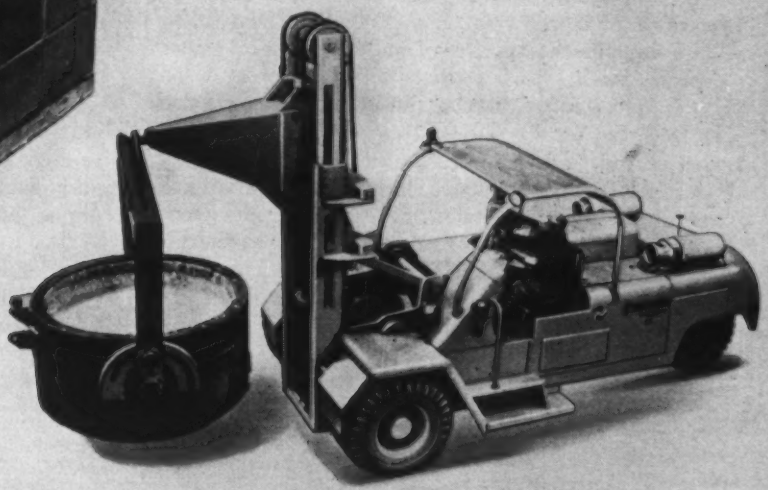
2 YOU RENT *without cash outlay!*

You don't tie up working capital when you *rent* Towmotor-Gerlinger fork lift trucks and material carriers. You put them to work immediately. You start cutting handling costs immediately. Your only cash outlay is one small monthly charge.

3 YOU BUY *and save as you pay!*

You don't pay cash for Towmotor-Gerlinger equipment when you use our low-cost Time Payment Plan. You make reasonable monthly payments. Low interest rates make it easy. Handling economies consistently pay the monthly cost many times over.



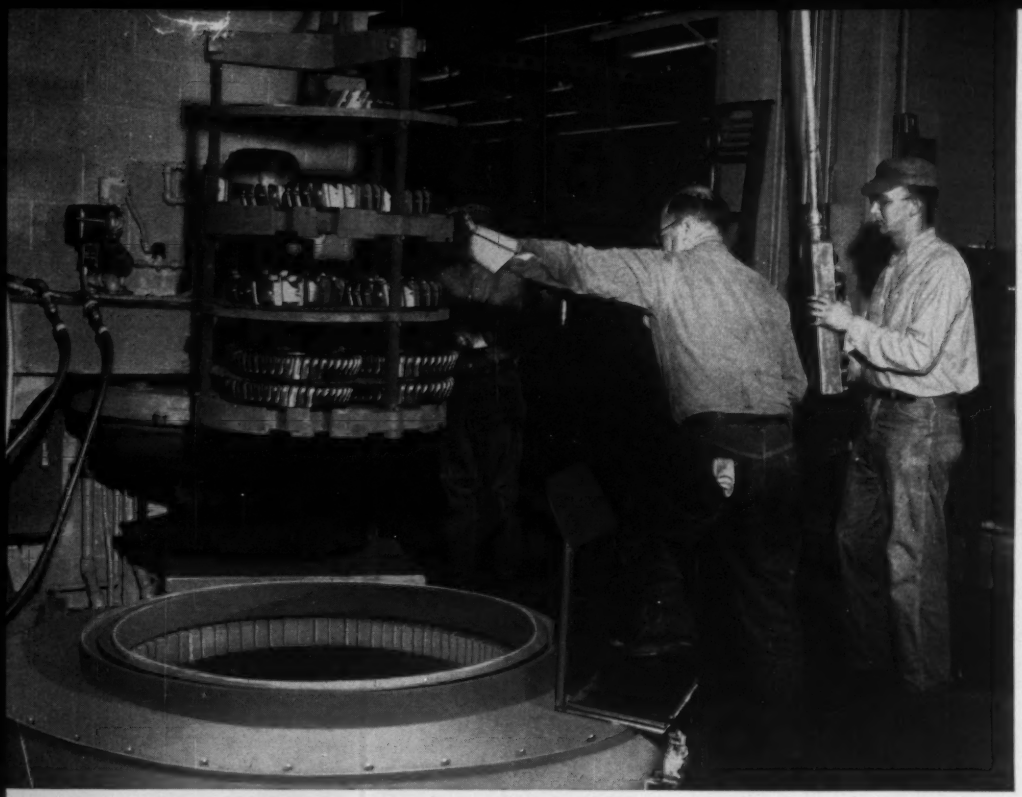


Complete factory-supervised maintenance can be included in *any* of the above plans! For complete information, write Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR -GERLINGER
THE ONE-MAN-GANG ®

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation



This Lindberg Furnace, Model CT3848-A, is being used at Ingersoll Milling Machine Company, Rockford, Illinois, for hardening Ingersoll inserted blade milling cutter bodies and also for gas carburizing. It is equipped with Lindberg's exclusive CORRTHERM electric heating elements. Temperature range 1850° to 2000°F.

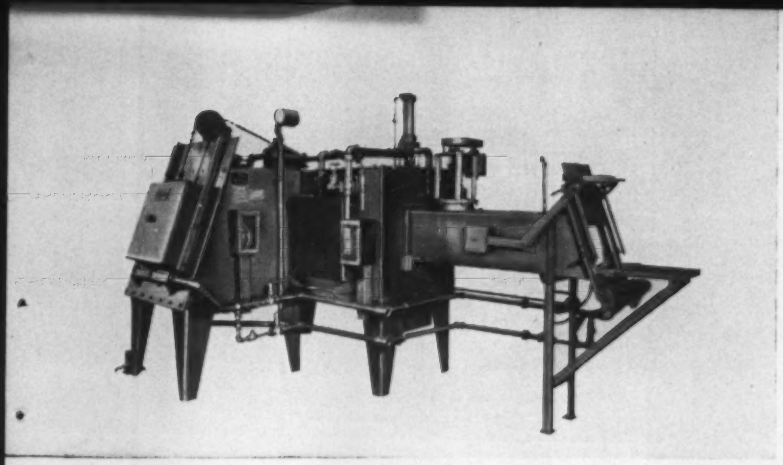
THIS VERSATILE LINDBERG FURNACE BELONGS IN MOST ANY METAL WORKING OPERATION

Heat treating installations across the country, captive or commercial, have found the versatility and dependability of this Lindberg furnace, either electric or fuel fired, a great production asset. Used at Ingersoll for hardening and carburizing, it is also ideal for a variety of heat treating needs including normalizing, annealing and tempering. This furnace occupies little floor space, handles a large volume of production and its rugged construction keeps maintenance costs uniformly low. At Ingersoll, it is one of several Lindberg furnaces in regular operation. Others include pit and box type Lindberg Cyclones and an L-type Furnace. Atmospheres are provided by Lindberg Hyen Generators.

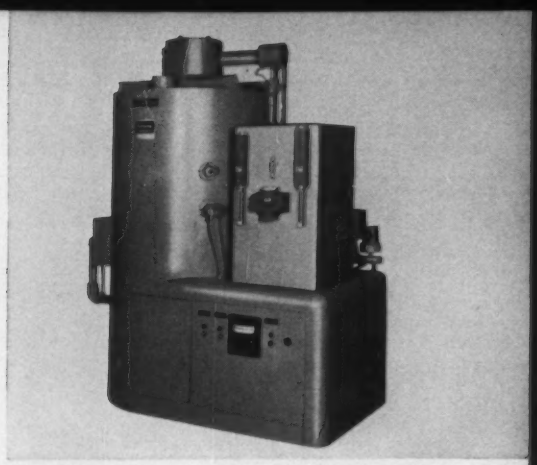
Lindberg has developed a wide variety of equipment for any industrial heat treating requirement. We provide everything from individual furnaces to complete, automated heat treating installations. These can either be factory-built or installed in your own plant. For the most satisfactory answer to any heat treating problem see your local Lindberg field representative (consult your classified phone book) or write direct to Heat Treating Division, Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Limited, Toronto.

Fixture being loaded with work while furnace is treating another load. Treated load will be removed and new load inserted quickly and easily.

CORRTHERM heating elements operate at extremely low voltage so heat leakage through carbon saturation is eliminated and shock or short hazard prevented. Makes possible use of electricity for carburizing without furnace retort.

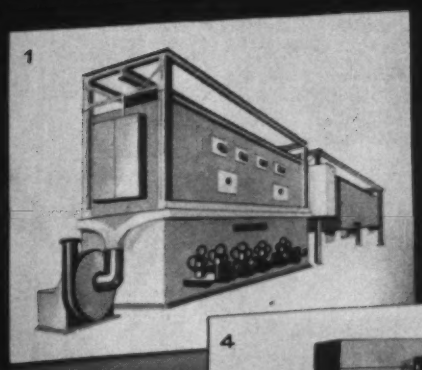


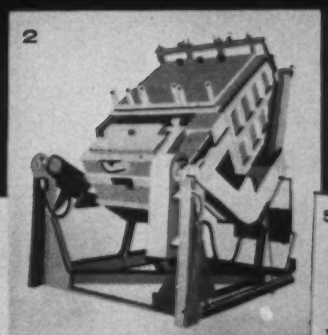
The Lindberg installation at Ingersoll includes one of our L-type Furnaces, ideal for treating high speed steel.

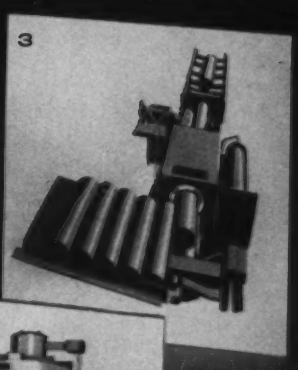


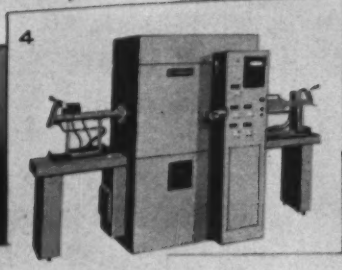
Atmospheres for Lindberg furnaces at Ingersoll are provided by Lindberg's Hyen Generator, a fully automatic process for producing endothermic atmospheres.

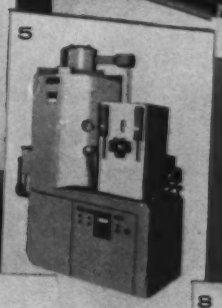
THERE'S LINDBERG EQUIPMENT FOR EVERY INDUSTRIAL HEATING NEED

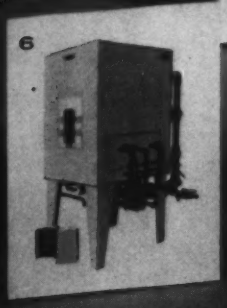


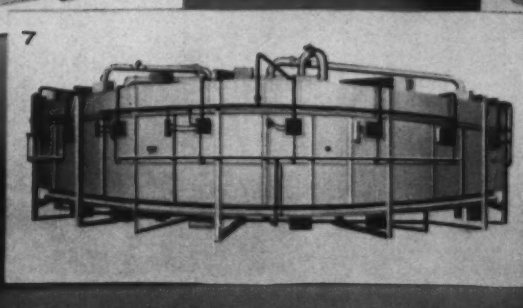












1 **Salt Bath Furnaces:** Complete line of Lindberg-Upton equipment for all types of salt bath treatment. Shown: Installation for aluminum dip brazing.

2 **Melting and Holding Furnaces:** Equipment for any non-ferrous metal requirement including electric resistance and induction reverberatories, crucible and two chamber induction units. Shown: 350 KW Induction Furnace with 30,000 lb. capacity.

3 **High Frequency Units:** Complete range of induction heating units and fixtures. Shown: New Induction Billet Heater for aluminum extrusions.

4 **Pilot Plant Equipment:** Complete group of intermediate sized furnaces for pilot plant and small production application. Shown: New Graphite Tube Furnace, temperature range 2500°F. to 5000°F.

5 **Atmosphere Generators:** Generators for all required furnace atmospheres. Shown: Hyen Generator for endothermic atmospheres.

6 **Ceramic Kilns:** All types of kilns: automatic, atmosphere controlled, high temperature, tunnel and periodics. Shown: Periodic Kiln, temperature range to 3250°F.

7 **Heat Treating Furnaces:** For every requirement, large or small, electric or fuel fired, factory built or field-installed. Shown: Rotary Hearth Furnace field-installed by Lindberg Industrial Division.

8 **Laboratory Furnaces:** Complete line of laboratory furnaces from simple hot plates to specialized research units. Shown: Versatile, wide temperature range Laboratory Box Furnace.

For full information on any type of Lindberg equipment see your local Lindberg field representative (look in your classified phone book) or write to Lindberg Engineering Company, 2452 W. Hubbard Street, Chicago 12, Illinois.

LINDBERG heat for industry

NATIONAL ACME'S
"ZONE OF RESPONSIBILITY"™
INCLUDES ALL PHASES OF COST REDUCTION

Check YOURS...Then Check National Acme

Direct Costs: these include direct dollar savings as realized by Minneapolis Honeywell . . . an "every day" job for Acme-Gridleys.

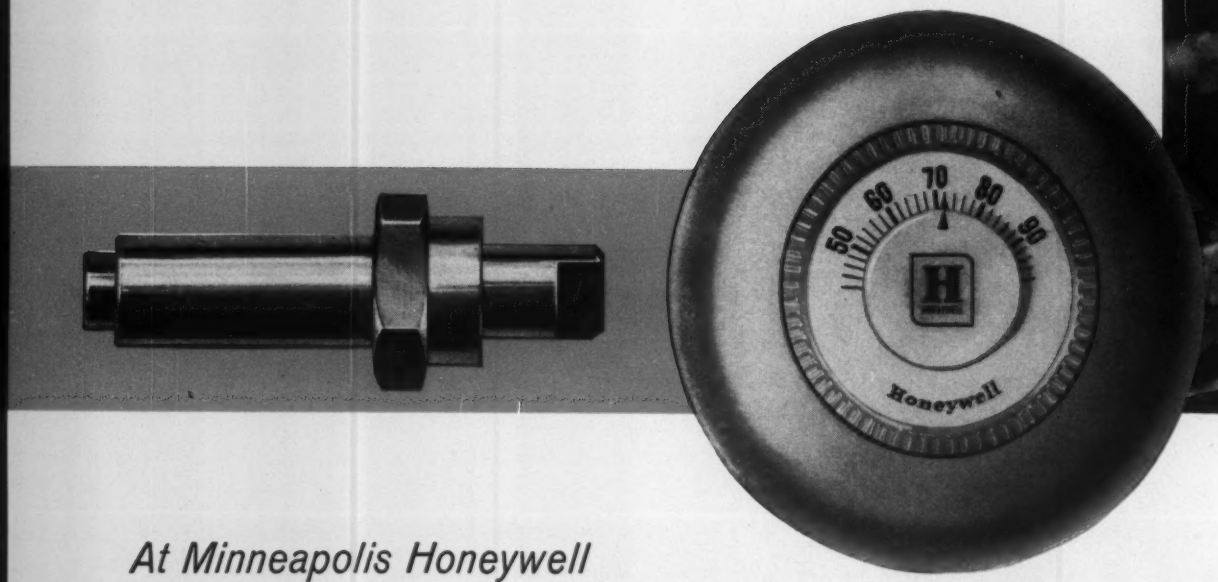
Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc.

Product Redesign: teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities.

Direct Material Costs: our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems.

Make-or-Buy Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment.

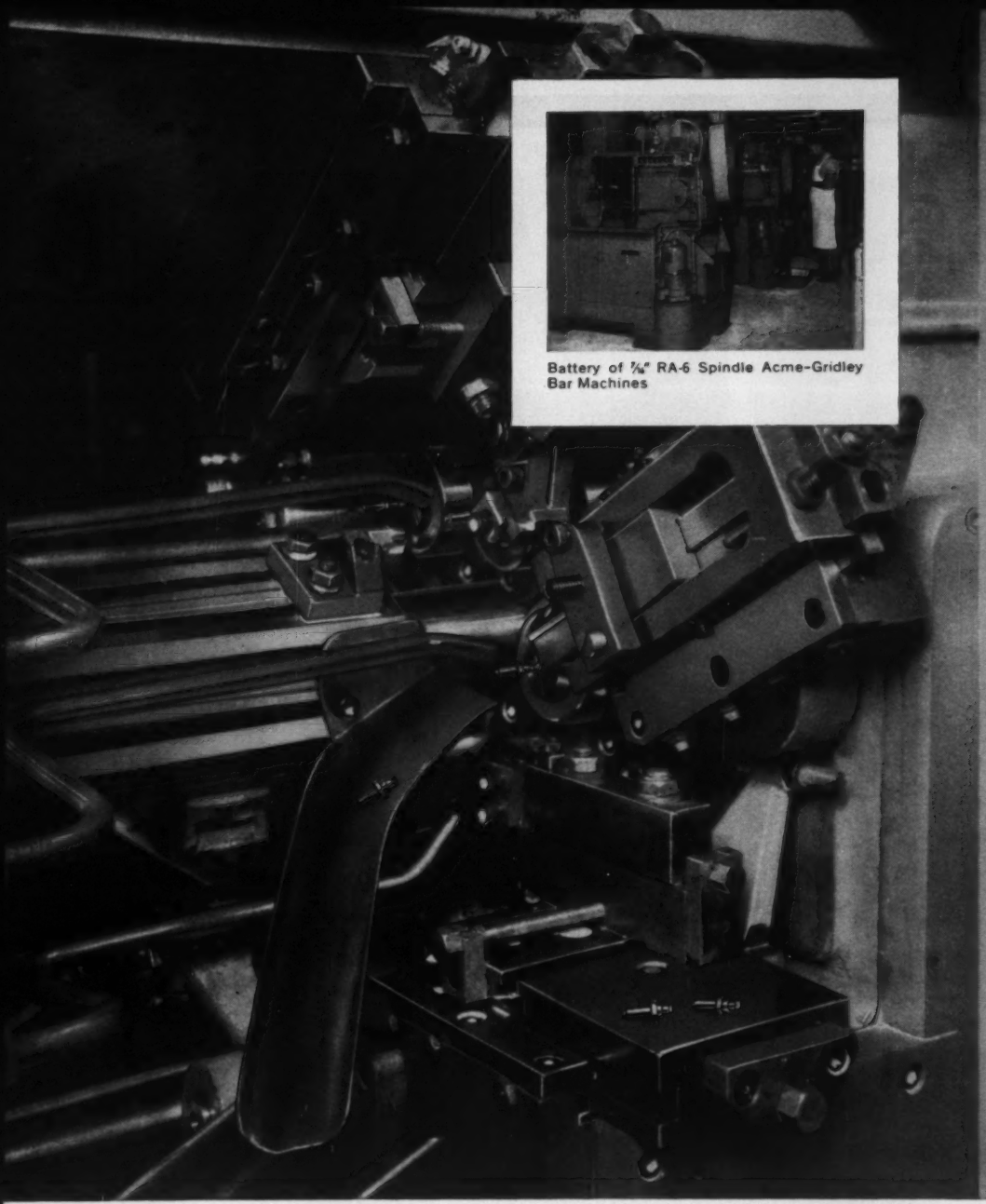
Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.



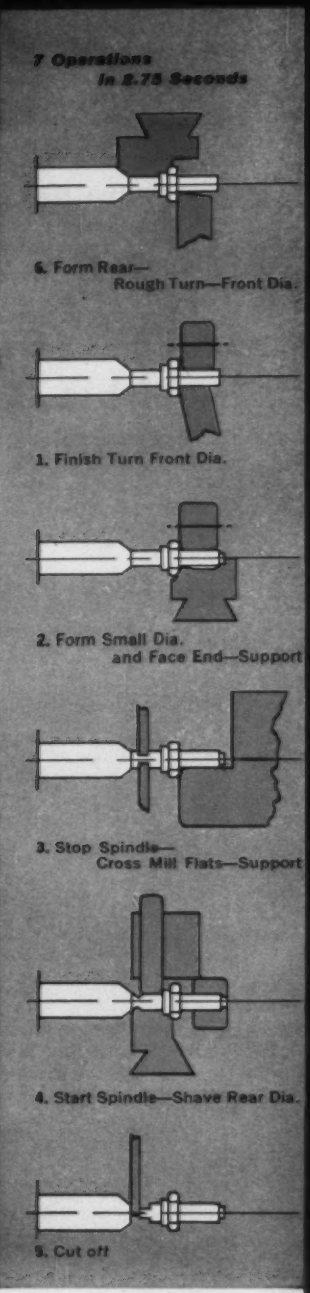
At Minneapolis Honeywell

ONE ACME-GRIDLEY REPLACES FIVE SINGLE SPINDLE MACHINES

. . . Saves 80% in Machine Hours



Battery of 7/8" RA-6 Spindle Acme-Gridley Bar Machines



Close up of tooling zone showing 3rd, 4th and 5th position operations

. . . *in addition* the reject rate is reduced 83% and operator hours per thousand slashed 92% in the production of a precision center post component for residential thermostats. What's more, with one machine, one set of tools, and one operator doing all machining in the primary setup, quality control is greatly simplified, and valuable floor space saved. Still further savings result from greatly reduced machine maintenance.

Such drastic savings are possible for Minneapolis Honeywell because of inherent Acme-Gridley features such as independently operated tool slides, the extreme accuracy and flexibility of direct camming, and wide open tooling zones. Rugged and versatile 7/16" Acme-Gridleys fit right in with Honeywell's program of "Total Machine Utilization"; will pay off for years to come by economically accommodating the materials and setups Honeywell requires in the production of small, high quality parts for their precision instruments.

Get the complete story on how Acme-Gridley Automatics provide industry's most modern approach to cost reduction. Call, write or wire.

Pioneer in Circumferential Automation

National Acme

The National Acme Company
175 E. 131st Street
Cleveland 8, Ohio

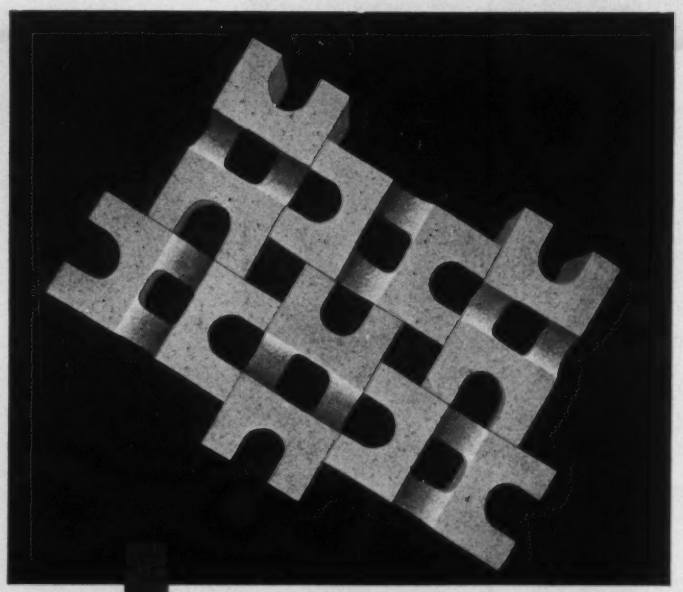
Sales Offices: Newark 2, N. J.; Chicago 6, Ill.; Detroit 27, Mich.

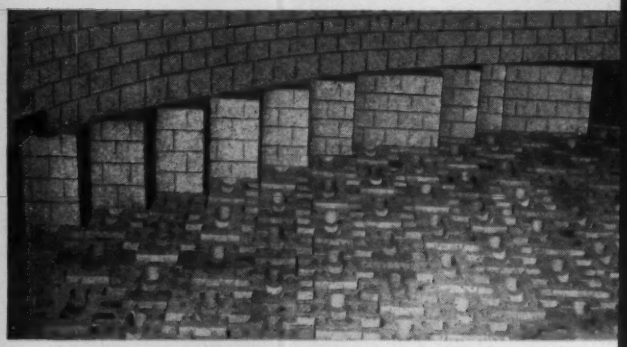
New design provides

25% to 50%

GREATER HEATING SURFACE

than ordinary basket weave checkers



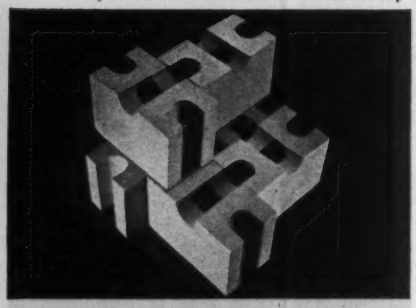


Tendency of checkers to twist in service is overcome by pilaster wall construction of the Bailey Hot Blast Stove.

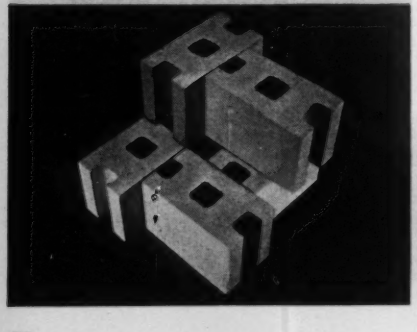
KENNEDY

BLAST FURNACE STOVE

CHECKERS



The regular Kennedy Checker (above) is of 3-hole design with unobstructed flue openings, 1¼" minimum wall thickness and a cross flue. It also can be furnished (below) without the cross flue feature.



This new 3-hole checker shape is laid in basket weave style to produce a solid 1¼" wall between each flue. This assures greatly increased heating surface without sacrificing the advantages of basket weave design.

The increased heating surface of the Kennedy Checker results in a correspondingly lower stack temperature. This makes possible the use of a modern steel bottom for supporting the checker system.

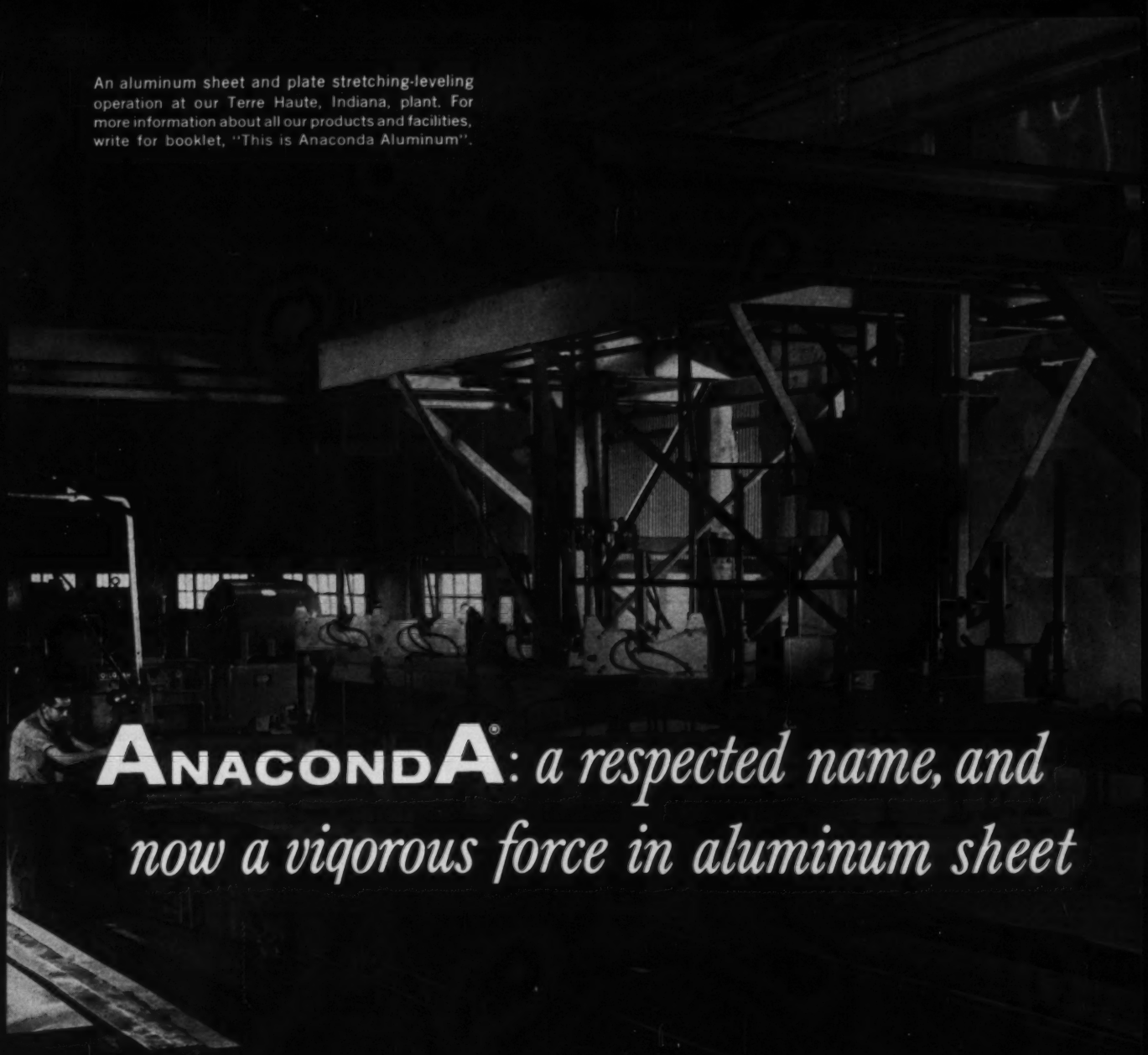
Write for Bulletin

WILLIAM M. **Bailey** COMPANY

ENGINEERS

LEADERSHIP THROUGH QUALITY

1221 BANKSVILLE ROAD PITTSBURGH 16, PA



An aluminum sheet and plate stretching-leveling operation at our Terre Haute, Indiana, plant. For more information about all our products and facilities, write for booklet, "This is Anaconda Aluminum".

ANACONDA®: *a respected name, and now a vigorous force in aluminum sheet*

When buying aluminum for your product...

PIG • INGOT • SHEET • PLATE • TUBE • PIPE • ROD • BAR • EXTRUSIONS • PLAIN AND LAMINATED FOIL

check with...

ANACONDA ALUMINUM®

ANACONDA ALUMINUM COMPANY • GENERAL OFFICES, LOUISVILLE 1, KENTUCKY

Copper Alloy Bulletin

BRIDGEPORT BRASS COMPANY

new BRIDGEPORT NIRONZE® 635 gives 90,000 psi yield strength

90,000 psi Yield Strength Obtained with New Age-Hardenable Copper-Nickel-Silicon Alloy

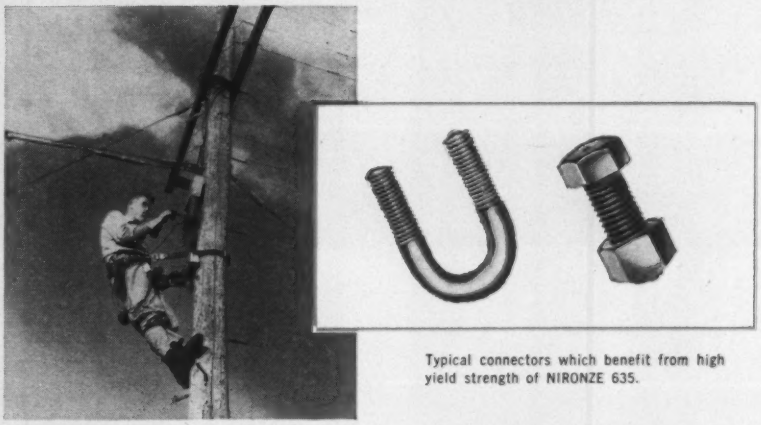
Bridgeport Nironze 635, an age-hardenable copper-nickel-silicon alloy, combines excellent cold-working properties with high tensile and very high yield strengths, good electrical conductivity, excellent general and stress-corrosion resistance. Supplied in the solution-treated and drawn condition, Nironze 635 offers exceptional cold-working properties. A low-temperature heat treatment, following additional cold-work age, hardens this alloy to produce tensile strengths of 100,000 psi, yield strengths of 85,000 psi and improved electrical conductivity of a minimum of 35% IACS.

Easily Cold-Formed... Machined

The excellent cold-working properties of Nironze 635 in the *solution-treated and drawn* condition allow such severe cold work as upsetting, cold-heading, roll-threading, bending, forming or similar operations to be carried out with ease. Heat treatment following this cold-work age-hardens this alloy to produce maximum tensile and yield strengths.

Nironze 635 in the *solution-treated-drawn-aged* condition has a machinability about 30% of free-cutting brass rod, thereby making it possible to carry out such conventional machining operations as sawing, grinding, turning, milling or similar operations.

Maximum cold-work may be performed on Nironze 635 in the *solution-treated* or soft condition. In order to obtain highest possible physical properties, this alloy must be cold-worked from 50-80% before aging.



Typical connectors which benefit from high yield strength of NIRONZE 635.

Proved by Performance in These Applications

Cold-headed bolts and fasteners used in pole line hardware, switch gear, wire connectors, neon signs, railway equipment, exposed electrical parts and structural supports, marine hardware and fittings can all use Nironze 635 to advantage. The new alloy's unique combination of high yield and tensile strengths, good conductivity and high corrosion resistance provides design and production advantages never before offered by a silicon bronze.

Test a Sample Now

Nironze 635 has been thoroughly evaluated in the laboratory and in the field to insure the high quality and top performance common to all Bridgeport alloys. To get your test samples and full technical information, call your nearest Bridgeport Sales Office. Or write us direct. Dept. 3404.

Nironze 635 is presently available as rod or wire, supplied in the solution-treated, solution-treated and drawn, and solution-treated, drawn and aged.

NIRONZE PHYSICAL PROPERTIES

Density	0.320 lb/in.³
Color Red	similar to copper
Thermal Expansion	8.9 x 10⁻⁶/°F
Melting Point	1990°F
Nominal Composition:	
Copper	97.5%
Nickel	1.9%
Silicon	0.6%
Total	100.0%
Electrical Conductivity, % IACS	
Cold-drawn and aged	30%
Cold-drawn	15%

MECHANICAL PROPERTIES (Nominal)

Form	Condition	Tensile Strength psi	Yield Strength psi	Elongation % (4D)	Contraction of Area %	Rockwell B Hardness	0/0 IACS
Rod and Wire	Solution-Treated	40,000	12,000	50	90	7	24
	Solution-Treated, Aged	88,000	70,000	12	20	86	43
	S.T. Drawn 50%	65,000	62,000	18	87	67	22
	S.T. Drawn 50%, Aged	100,000	90,000	12	25	95	42
	S.T. Drawn 80%	70,000	65,000	15	85	73	22
	S.T. Drawn 80%, Aged	103,000	97,000	17	62	96	39

COMPARATIVE RATINGS OF NIRONZE 635 vs STANDARD SILICON BRONZES

	Physical Properties			Fabrication Properties			Mechanical Properties		
	Electrical Conductivity (Annealed) % IACS	Melting Point Liquidus °F	Density lb/in.³	Cold Workability	Machinability Rating %	Annealing Temp. °F	Tensile Strength psi	Yield Strength psi	Rockwell B Hardness
NIRONZE 635	*35	1990	0.320	Excellent	*30	**850-900	100,000	85,000	95
High Silicon Bronze (A)	7	1880	0.308	Excellent	30	900-1300	108,000	60,000	95
Low Silicon Bronze (B)	9	1940	0.316	Excellent	30	900-1250	90,000	67,000	90

*Drawn and aged **Aging temperature

©The term "Nironze" is a registered trade-mark of the Bridgeport Brass Company

BRIDGEPORT BRASS COMPANY

Bridgeport 2, Connecticut • Sales Offices in Principal Cities

Specialists in Metals from Aluminum to Zirconium

When fastenings fail...

it may be your reputation that suffers most

When so much literally hangs on a bolted connection—as in this swing—the importance of a single nut becomes dramatically clear: *If the nut lets go, tragedy!*

In a sense the same is equally true of complex and costly products like farm equipment, washing machines, computers—or any other product you make that is subject to vibration when it is operating.

If your customers can't count on critical connections staying tight under punishing field conditions—and, even should the actual damage be slight—if they're faced with failure and expensive downtime because a nut lets go—you've had it when it comes to reorders!

The moral is clear. You simply can't afford to have your product's reputation for reliability ruined by fasteners that can't be relied on.

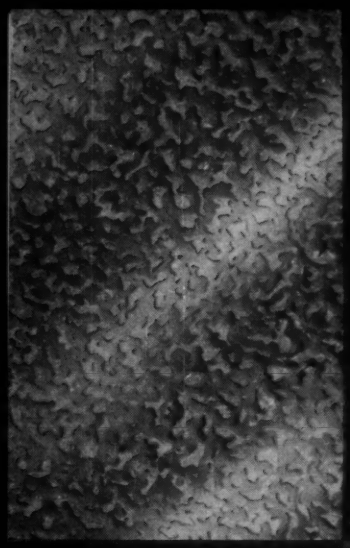
For more than 20 years, many of America's top manufacturers have relied on Elastic Stop® nuts to protect their product's reputations. They've learned that Elastic Stop nuts with their exclusive nylon locking inserts *simply will not work loose!* Not under the toughest impact, shock or vibration! Never! They stay put to give your product low cost insurance against fastener failure—the kind of insurance you can't afford to be without!

When you remember that reorders are written in your customers' maintenance records, you'll want to see how these leading companies protect the good name of their products with Elastic Stop nuts. Write for our interesting Bulletin No. 5901 Dept. S46-577, Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

ESNA®

for the ring of reliability

ELASTIC STOP NUT CORPORATION OF AMERICA



Donald Deskey has been a leader in the industrial design field for more than 30 years. A pioneer in the modern design movement in the United States, Mr. Deskey's influence has helped to bring stability, scope and depth to the profession and is reflected in services rendered to an impressive list of well-known companies.

The Donald Deskey Associates creative staff is one of the largest in the industrial design profession, embracing experts in package and product development, planning, diversification studies, materials research, manufacturing methods and processes, architecture, corporate identification, and marketing analysis.

New Deskey office furniture designs feature mark-resistant patterned . . .

Design versatility is clearly apparent through the combination of Sharon Stainless Steel and Sharonart® in this modern office furniture group by internationally famous designer Donald Deskey.

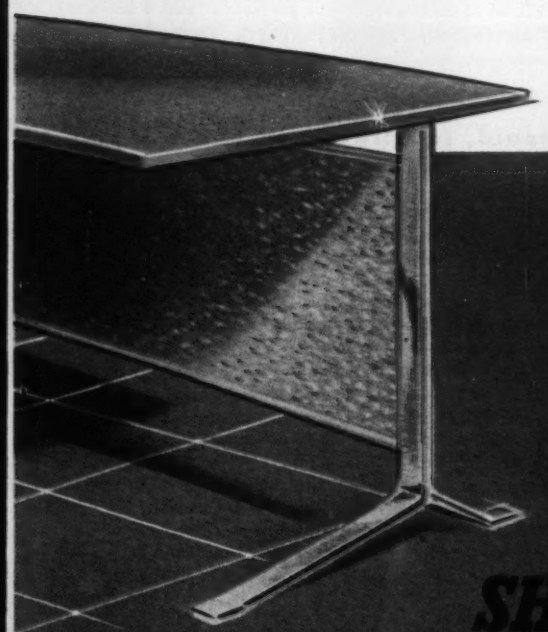
Colorful, efficient, long-lasting office furniture is the result of combining the beauty of Stainless Steel and the luxurious texture and mark-resistance of Sharonart®.

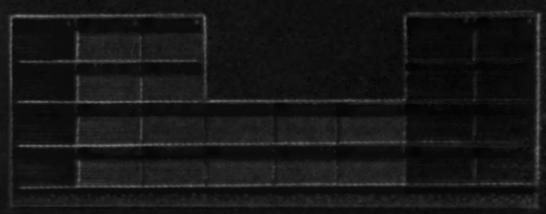
Stainless is available in bright or satin finish, or with Sharonart® patterns.

Sharonart® can be produced in an almost limitless number of patterns. Made of carbon steel, Sharonart® forms easily in standard forming equipment. It can be painted, plated or vinyl coated with beautiful results. For more information on Stainless Steel or Sharonart® write *Sharon Steel Corporation, Sharon, Pa.*

.... SHARONART

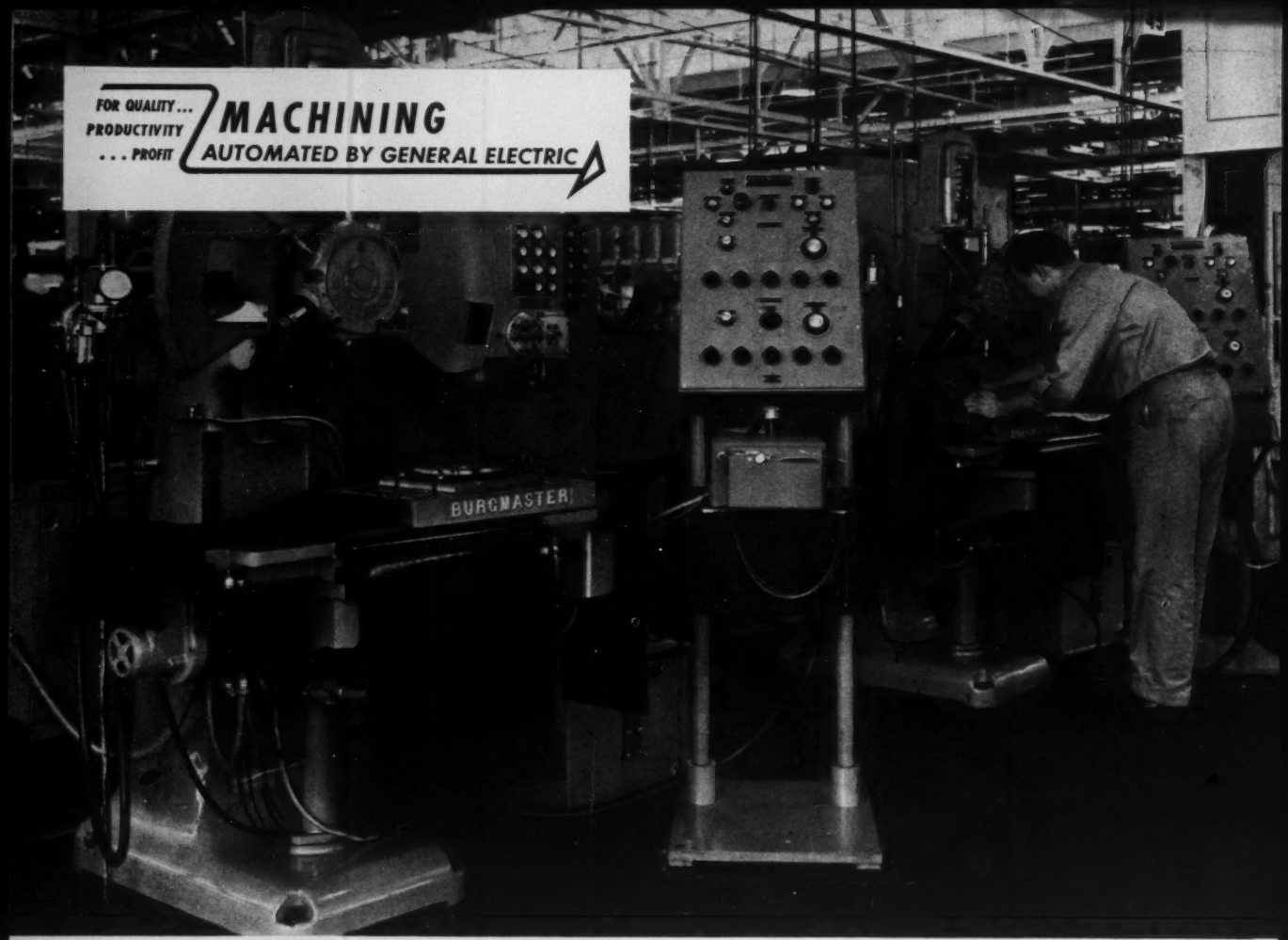
The products pictured on this page are in design form only. They were developed by Donald Deskey Associates, one of America's most respected designers of modern furniture.





SHARON *Quality* STEEL

Steel



INCREASE WORKER PRODUCTIVITY

MARK SERIES NUMERICAL CONTROLS...

.....standard, job-proved packages now in use on a wide variety of machines

General Electric's Mark series of standard, pre-engineered numerical control packages—with systems for controlling 1 to 5 motions plus machine auxiliary functions — are compiling impressive performance records on scores of machines throughout American industry today.

Machine operation is completely automatic—from punched tape prepared on a standard automatic typewriter. If desired, semi-automatic positioning, useful for prototype work, is obtained with manually set dials on the control station.

Key components of a typical Mark package are a controller, a punched tape reader, operator's control station, servo drives and position-sensing units.

8-TO-1 TIME REDUCTION in press operations is achieved on this 100-ton rotary-turret punch press directed by General Electric numerical control. Rapid positioning of table and turret provides up to 40 punches per minute.

40% AVERAGE TIME REDUCTION for all parts produced on this horizontal boring machine means greater output and better equipment utilization. Lead times are cut by 8-to-1, and non-productive worker time is reduced by more than 60%.

with General Electric numerical control

Boost output of man and machine, reduce in-process inventory

Over the past 7 years, management has seen labor costs increase by 50% with productivity up by only 15%. This profit-cutting gap has accelerated an industry-wide need for production methods such as General Electric numerical control.

Key benefits of G-E numerically controlled machines include increased worker output, increased machine utilization, and reduced in-process inventory in virtually every job.

Manufacturers are now realizing far greater output per man-hour . . . faster "pay-back" rates on machines . . . shorter production cycles . . . and much lower inventory investment—in itself justification for numerical control. Here's an example:

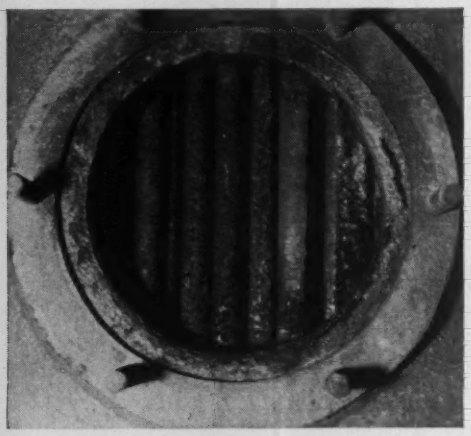
Automatically controlled turret drills are used to produce aircraft-engine accessories at Chandler Evans Corporation, West Hartford, Conn. With numerical control, direct-labor costs have been cut in half! The machine operator — working two machines simultaneously — loads the piece, sets the machine in operation, and all production is performed automatically. But, increased productivity is only part of the story. Scrap losses are virtually eliminated, average lead times are cut by 6-to-1, cutting-tool costs are 1/40th of former production methods, and tool life is increased from 30 to 1300 pieces per tool—all adding up to expected *annual* savings of $42,000, more than enough to pay for both machines within two years.

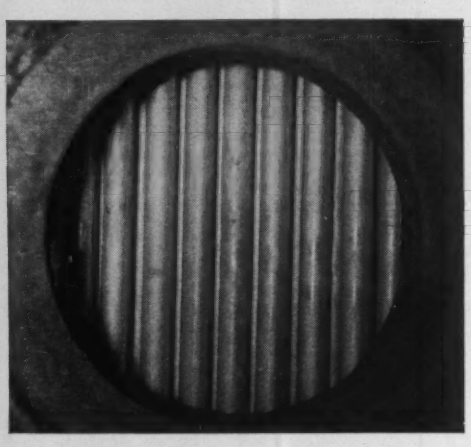
Join with Chandler Evans and hundreds of other manufacturers who are increasing productivity, gaining better product quality, and eliminating tooling cost with G-E numerically controlled machines. See your G-E Apparatus Sales Engineer or machinery builder today. General Electric Co., Specialty Control Dept., Waynesboro, Va. 795-7

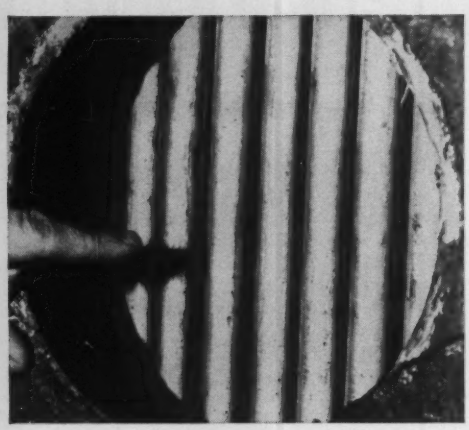
Progress Is Our Most Important Product

GENERAL ELECTRIC

SOY BEAN PROCESSOR STOPS CONDENSER CORROSION WITH...







It was a modern, automatic, highly efficient plant. But steam, hexane vapors and amino acids did this to phosphorized admiralty tubing in the condensers after only two years. Oxidation (during shut-downs), vibration and thermal fatigue also took their toll. Red brass tubing was substituted. In two more years, the tubing failed again.

CARPENTER STAINLESS TUBING...

To find the answer, intensive corrosive tests were made on sample sections of red brass, admiralty, cupro-nickel, and several types of stainless tubing from different manufacturers. All tubing showed corrosion except Stainless Types 304 and 316. Carpenter Stainless 304 was finally selected because it was the least expensive of the two that held up.

EVEN AFTER FIVE YEARS!

After 5½ years of continuous service in the condensers, Carpenter Stainless 304 is as good as new and the soy bean processor "expects them to last indefinitely." Baffles, installed with original tubing, were no longer needed. Oxidation damage was stopped. Expensive plant shutdowns and costly maintenance were past history.

Dependable Carpenter Stainless Tubing is solving heat exchanger and corrosion problems like this for chemical processors coast to coast. For technical help or prompt mill stock delivery, call your Carpenter man today. The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Steel

your master key to cost-saving corrosion control

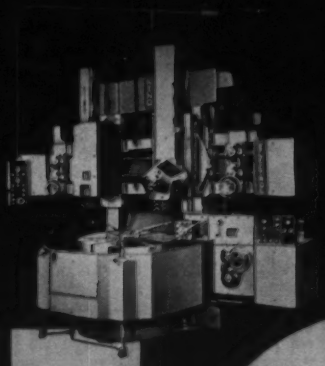
Carpenter

Stainless Tubing & Pipe

When you talk about the

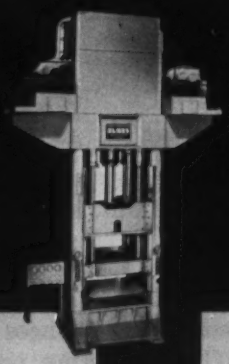
***BETTER* MACHINE TOOLS**

you'll talk about



KING

VERTICAL BORING AND TURNING MACHINES



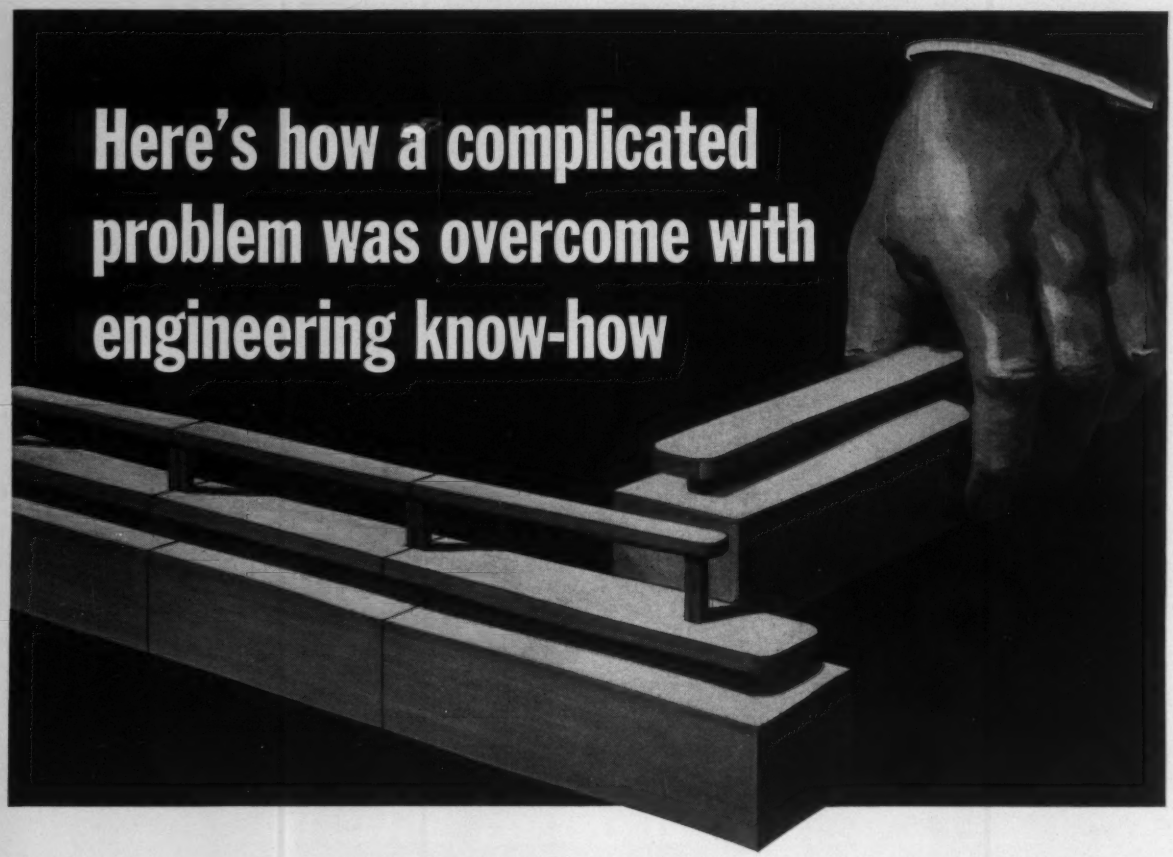
ELMES

HYDRAULIC PRESSES AND EQUIPMENT

for Metalworking, Plastics Molding, Custom-designed Applications.

American Steel Foundries **ELMES/KING DIVISION,** Cincinnati 29, Ohio

Here's how a complicated problem was overcome with engineering know-how



UDYLITE HAD THE ANSWER

PROBLEM: To adapt a full automatic plating machine to the Udylite Bi/Nickel process, which required the addition of an extra nickel plating operation for deposit of semi-bright nickel immediately preceding full bright nickel plate. It was also desirable to gain versatility so the full automatic could be used for either straight bright nickel or the Bi/NICKEL process.

LIMITATIONS: Plant length prohibited the extension of the existing machine at either end.

THE UDYLITE ANSWER: A semi-automatic machine was added at right angles to the existing full automatic. A simple transfer system was engineered and built to "detour" parts through the semi-bright process in the new semi-automatic machine and back to the full bright process in the automatic.

FLEXIBILITY BONUS: Easily accomplished conversion changes the machine to the Bi/NICKEL plating process or reverses it back to its original cycle for single bright nickel plating.

Udylite engineering ingenuity here proved that it is possible to take advantage of the latest new process developments with inexpensive machine change-overs. You'll find it worth investigating—see your Udylite man now or write directly to—

the udylite

world's largest plating supplier

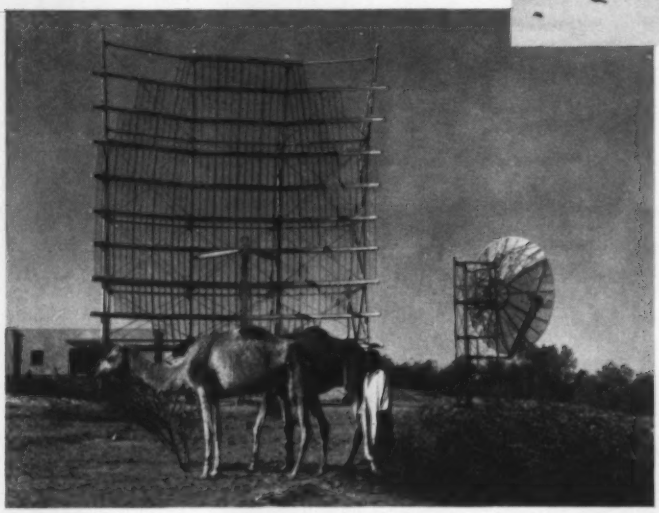
corporation • Detroit 11, Michigan

on the west coast: the L. H. Butcher Company

EXPANDED ALUMINUM FOR ANTENNA EFFICIENCY...

from the Arctic

The two radar antennas, shown as a background for the caribou in this actual photo, are part of the country's defense setup.



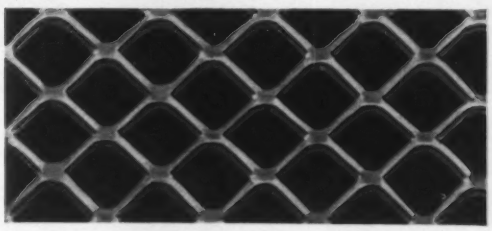
to the Sahara

These antennas beam voice signals to the troposphere, 6 to 12 miles above the earth's surface. From there the signals are reflected back hundreds of miles. (Photos courtesy of D. S. Kennedy & Co.)

On the job, in totally diverse sections of the world, and differing as to purpose, the antennas illustrated have one thing in common: Penmetal *Square Mesh*. This is a special expanded aluminum mesh developed by Penn Metal Company for antenna use. It is the most versatile reflecting surface yet developed for radio, radar and telemetry reception, providing constant response for radio energy regardless of polarization.

The upper photo, taken in the Arctic, shows units of the Dew Line, the far-flung "ears" of the country's defense setup. The antennas in the desert are part of a new communications system for Libya that permits telephone conversations over great distances without the use of poles or wires.

Square Mesh is but one of many unusual products developed by Penn Metal Company in cooperation with industrial designers during the last 90 years. Put this experience to work tailoring special meshes to your requirements. Send for a copy of catalog 521-EM.



PENN METAL COMPANY, INC.

Expanded Metal Sales Office:
P.O. Box 1460, Parkersburg, W. Va.
Executive Offices: 40 Central Street, Boston 9, Mass.
Plant: Parkersburg, W. Va.
District Sales Offices: Boston, New York, Philadelphia, Pittsburgh, Chicago, Detroit, Dallas, Little Rock, Seattle, San Francisco, Los Angeles, Parkersburg, St. Louis

METAL MARK Penmetal 1850 OF QUALITY

a name to remember

PM-240

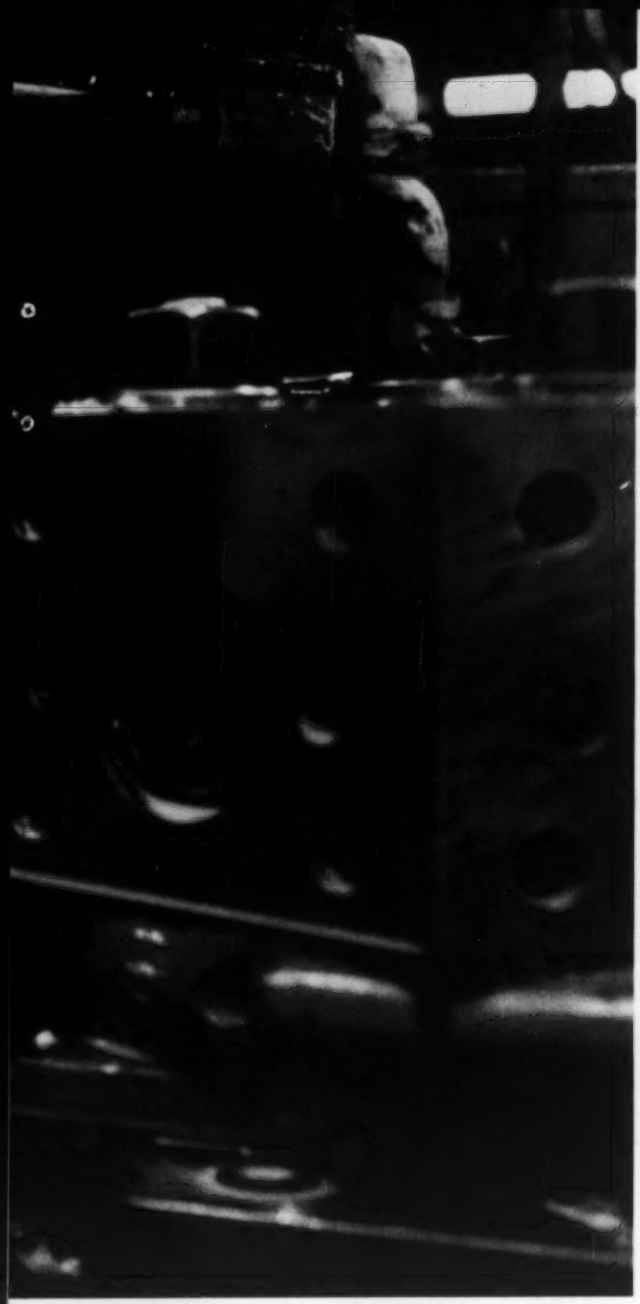
Extends tool life, maintains precision with Gulfcut® oils . . .

GULF MAKES THINGS

At its factory in Grand Rapids, Michigan, Automatic Music, Inc., operates over 400 machine tools to turn out the hundreds of small precision parts that are required for their famous coin-operated record players. More than 30 types of alloys, brasses, carbon steels and other metals are machined, many to tolerances of .0001".

One critical "juke box" component is the aluminum selector wheel, made to hold 200 pins, or one for each musical selection offered. Wheels are chamfered, bored, reamed, grooved, turned and burred in two minutes. At 208 rpm, using carbide-tipped tools, considerable heat would be generated, so Automatic Music uses Gulfcut Soluble Oil in a 1:50 emulsion. The machine operator reports long tool life, and what's more—"It's easy on the hands."

Another part requiring particular precision is the coin-control pin that rejects slugs while accepting nickels, dimes and quarters. Seven operations are involved in machining these pins on two turret lathes. For this, Automatic Music uses Gulfcut 41C, a sulfo-chlorinated-lard cutting oil that gives good finish, accurate tolerances and long tool life. On the average, the high speed tool needs



Gulfcut 41C helps insure fine surface finishes and contributes to accuracy. Machinist Harry Ames grinds the high-speed tool once per shift on the average.

Automatic Music's Machine Repair Supervisor, Dan Van Heteren (right), shows small precision component to Richard Shumacker, Gulf Sales Engineer.

Aluminum selector wheel for Automatic Music "juke box" is completely chamfered, bored, reamed, grooved, turned and burred in two minutes. Gulfcut Soluble Oil in a 1:50 emulsion carries heat away from the carbide-tipped tool edge.

RUN BETTER!

to be ground only once a shift. Altogether, the firm uses Gulfcut 41C in fourteen turret lathes, all screw machines and more than a hundred drill presses.

Perhaps *your* machining operations can be improved by the use of Gulfcut oils. To find out, just call your Gulf office. Meanwhile, write for your free copy of the new 116-page handbook "Metal Machining with Cutting Fluids."

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

☐ Send free copy of "Metal Machining with Cutting Fluids."
☐ Send illustrated literature on Gulfcut oils.

Name _____

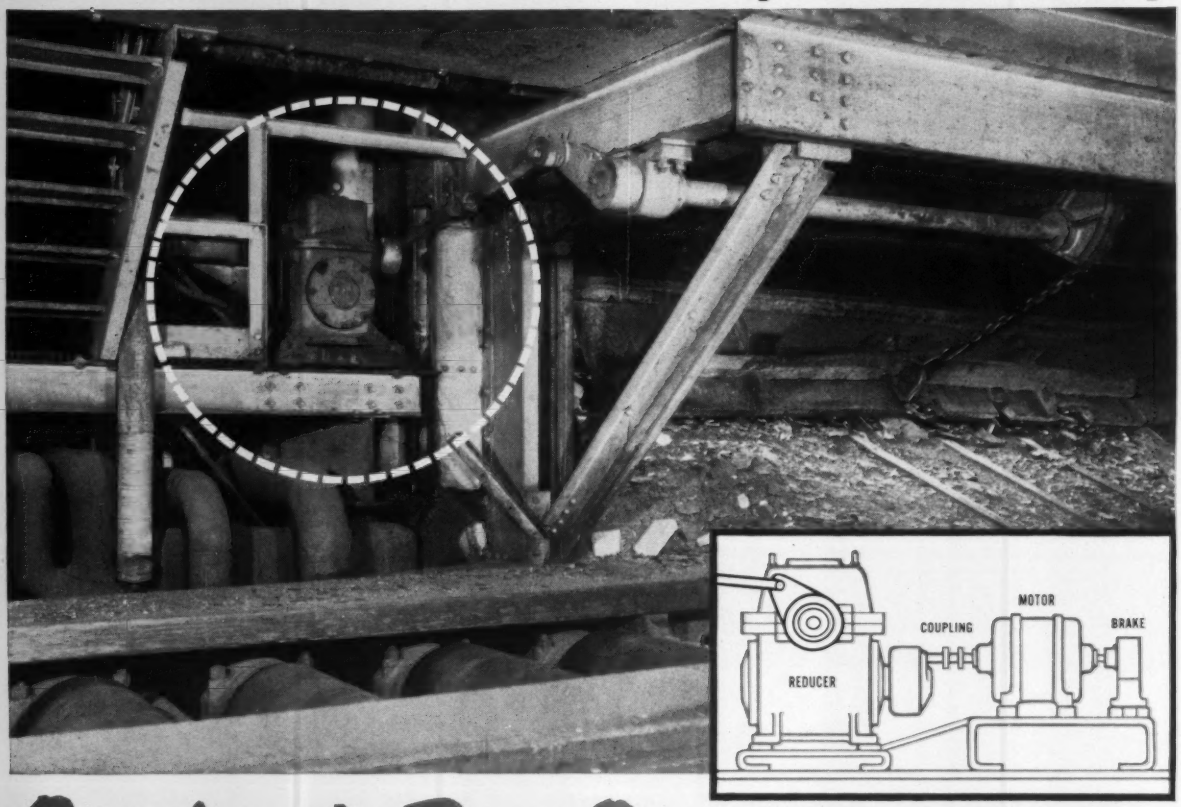
Title _____

Address _____

City _____ Zone ____ State _____

SP-9786

Foote Bros. Drives In The Primary Metals Industry



Opening the Door On TOMORROW

Every time this Foote Bros. Worm Gear Reducer operates, "tomorrow" . . . and the promise it brings of better living for more people, comes a little closer.

Installed in the modern 44" Hot Strip Mill at Inland Steel Company's Indiana Harbor plant, this Reducer opens one of two discharge doors on the No. 4 Reheat Furnace to begin the process of converting red hot slabs into coils of sheet steel which will be used by Inland's customers to produce better products for better living for more people. Another Foote Bros. drive is used to open the other door.

Steelmaking calls for rugged, dependable equipment and Foote Bros. Reducers meet these requirements in every respect. Precision generated gearing, heavy duty shafts and high capacity bearings are all designed to provide the kind of trouble-free service required in today's high speed steelmaking operations. Maintenance men have no trouble with the many Foote Bros. Drives at work in the Inland plant because these drives are built for "no downtime" service.

There's a Foote Bros. Drive for your power transmission requirements. Ask your nearby Foote Bros. Authorized Distributor for information or assistance concerning your power transmission problems. He's ready to help you.

FOOTE BROS. GEAR AND MACHINE CORPORATION

4565 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

Advantages for You

IT ALL COMES DOWN to one fact... that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered, scaleless tempered, tempered and polished, blued or strawed.

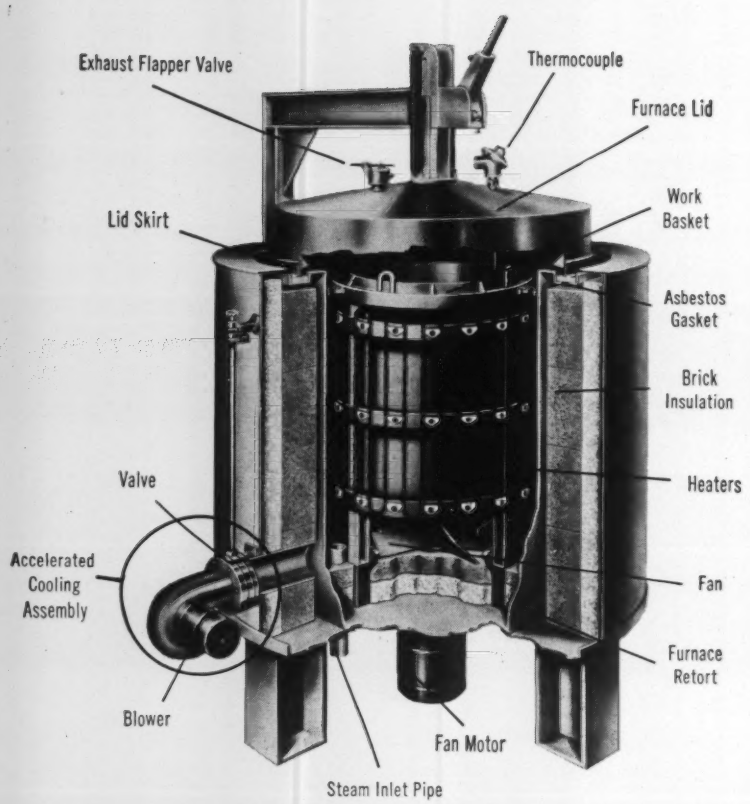
You pay for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. For details, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

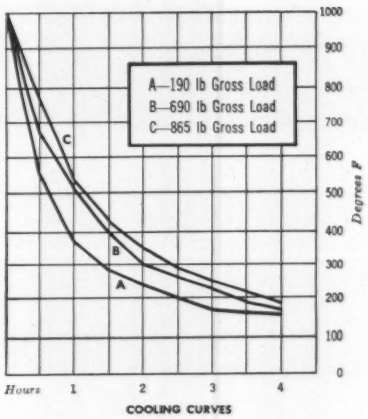
A few of the thousands of high-quality items made from superior Roebling cold rolled steel.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it





PROBLEM: To cut down cleaning cost of non-ferrous parts
SOLUTION: Heat treat and cool under protective steam

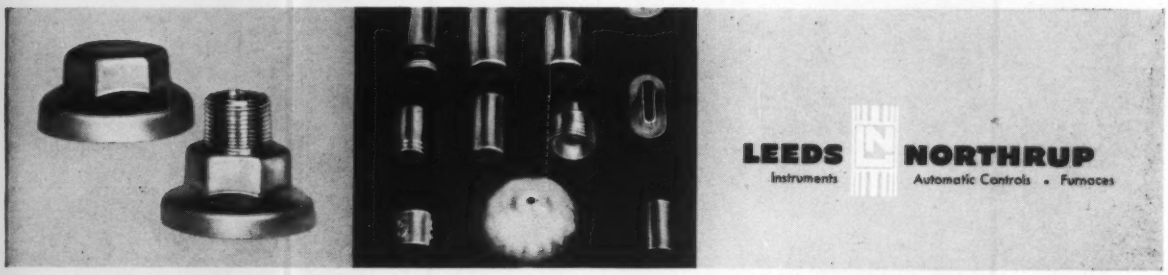
Plants fabricating parts from copper, beryllium copper, brass or bronze can now show appreciable savings in the cost of cleaning operations by the use of steam atmosphere heat treating.

Parts are age hardened, stress relieved or annealed in a steam atmosphere, then quick cooled to a safe temperature under the same protective atmosphere before removing from the furnace.

To make this practical on a production basis, L&N Steam Homo furnaces now incorporate a blower assembly to permit fast, uniform cooling under steam.

The result? Brass and copper parts formed by deep drawing do not require pickling after annealing between successive draws. Screw machine and blanked parts are now clean and scale-free after stress-relieving. The need for mechanical cleaning, pickling and rinsing these non-ferrous parts is eliminated. When parts are to be plated only a bright dip is necessary.

Why not see the results for yourself? Just send us a few samples of your parts . . . let us steam treat them and return them to you for evaluation. For more information about this service or a copy of our Catalog TD2-620(1) about the Steam Homo Method, contact your local L&N office or write us at 4956 Stenton Ave., Phila. 44, Pa.



These brass radiator steam-vent shells require 9 draws, 4 anneals. With steam treating the manufacturer eliminated the pickle after each anneal and a heavy pickle before chrome plating . . . now uses only a bright dip, and has substantially cut buffing time.

When this manufacturer of lip-stick tubes and cosmetic containers installed a steam Homo furnace for annealing, pickling to remove scale was eliminated. Subsequent figures from the cost accounting department showed annealing costs reduced by 53%.

He's making a Monarch Lathe...

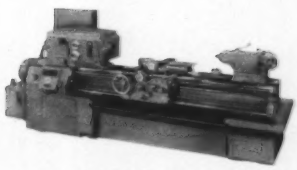
Resilient cast chrome-alloy iron beds, hardened (depth 1/8" plus) and ground, furnish 1-piece ways and bed with unequalled vibration dampening, more strength, better lubrication factors. Over 30,000 in use!

One example of where the extra values come from—in your MONARCH Lathes

You never saw this flame-hardening procedure until Monarch perfected it. But for many years, it has produced lathe beds without equal for sustained hard use, with retained original accuracy. Yes, this man is making a Monarch lathe in the truest sense. His job, typically, consists of building into all Monarch lathes the intrinsic, exclusive features that become your ultimate dollar's worth.

As a result, you can expect your modern Monarch to so lower costs that, after paying for itself out of savings in a 3 to 4 year span, it will continue to benefit your competitive stance for years. How? By increasing production; by lengthening tool life; by delivering such accuracy and finish as to cut considerably—or eliminate—finishing operations.

What more can your capital expenditure dollars buy? Everyone in your organization concerned with such decisions should be familiar with our story—which we'll gladly send. . . . THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.



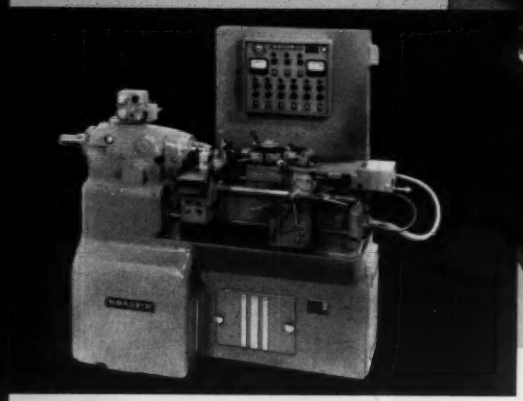
WHEN YOU BUY VALUE
MONARCHS COST LESS

Monarch
TURNING MACHINES

VISIT MONARCH—*We'll turn your part to return you profit*

Don't Tool Up for Tomorrow's Boom with Yesterday's Lathes

MONARCH HIGH PRODUCTION LATHES OF TOMORROW



The Model B Speedi-Matic—recommended for lots ranging from less than 25 to more than 2500 pieces. Bar stock capacity—⅞″

5. The New Model B Speedi-Matic... A Fast, Precision, Hand Screw Machine

Speed and accuracy of output have always typified the Monarch Speedi-Matic. Now with the latest developments in electronic speed control, a hydraulically powered turret and a host of other improvements, the 5 H.P. Model B is even better adapted to today's exacting requirements. Major features include:

(1) A control center that provides preselected, automatic speed and feed change for each tool position. Speed range is infinitely variable from 40 to 4000 R.P.M.; feed range, infinitely variable from ⅛″ to 16″ per minute. You get the most efficient speed and feed for each operation, consequently maximum production.

(2) A power feed, ram type turret, the turret head of which is hydraulically indexed, hydraulically located in the new position to an accuracy of less than .0002″ and hydraulically clamped in position. It is also automatically lubricated.

(3) A feed box, powered by an electronically controlled feed motor.

(4) A powerful, lever operated, self-centering cut-off and forming slide that moves on preloaded ball bearings and carries its own forced feed lubrication system.

(5) Electrical controls to J.I.C. standards. The spindle and feed control elements are in the form of plug-in modules for ease of maintenance.

(6) Simplicity of setup to the degree that the time is regained during production of the first few pieces.

If one of your problems is the economical production of precision screw machine parts in small and medium size lots, then the Model B Speedi-Matic is for you. It will take only a few moments of your time to write for full information. . . . The Monarch Machine Tool Company, Sidney, Ohio.

Monarch TURNING MACHINES

IF IT CAN BE TURNED, THERE'S A MONARCH TO DO IT BETTER AND FASTER

SOLVING MATERIAL DESIGN PROBLEMS

FABRICATING

Buy the parts not the problems. From large and unusual shapes to parts so small you inspect with a jeweler's glass . . . CDF's special fabricating facilities can do your job faster, more economically.

Every part pictured above is completely fabricated by CDF, except the etching operation for the printed circuits.

There's an excellent chance you can save on set-up and production time, and reduce unit costs by asking CDF to give you an estimate on final fabrication of laminated plastics, vulcanized fibre and electrical insulating materials.

Our machines, all 2,000 of them, are set up for just one purpose—the forming, machining and molding of the many types of materials that we produce.

Most important of all, you can combine economy with the exact properties you're looking for. CDF offers you a choice of materials from the industry's widest selection of laminated plastics, vulcanized fibre and electrical insulating materials. Check your Sweets PD file or write for General Folder 60.

CDF®

CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Budd COMPANY • NEWARK 85, DEL.

In Canada, 46 Hollinger Road, Toronto 16, Ont.

Machining low-cost tracks for sliding glass doors. Made by CDF from Diamond vulcanized fibre. It's tough, yet light in weight.

Molding automobile timing gear blanks made from CDF's Celoron molding material for maximum wear and a minimum of noise.

Postforming back-up disc for a sander. Made from a Dilecto laminated plastic to get maximum toughness and resiliency.

Dean Strand solved an unusually

Dean Strand's many years as an Abrasive Specialist and a salesman for machinery that uses grinding wheels have covered most of the problems in the book. That's why he so often finds practical solutions that are *not* in the book.

PROBLEM – An unusual grinding problem faced Illinois Tool Works, Chicago, when they began manufacturing a special steel gear shaper cutter. They required a grinding wheel that would generate an involute curve on the sides of the gear shaper cutter teeth, grinding with the side instead of the periphery of the wheel.

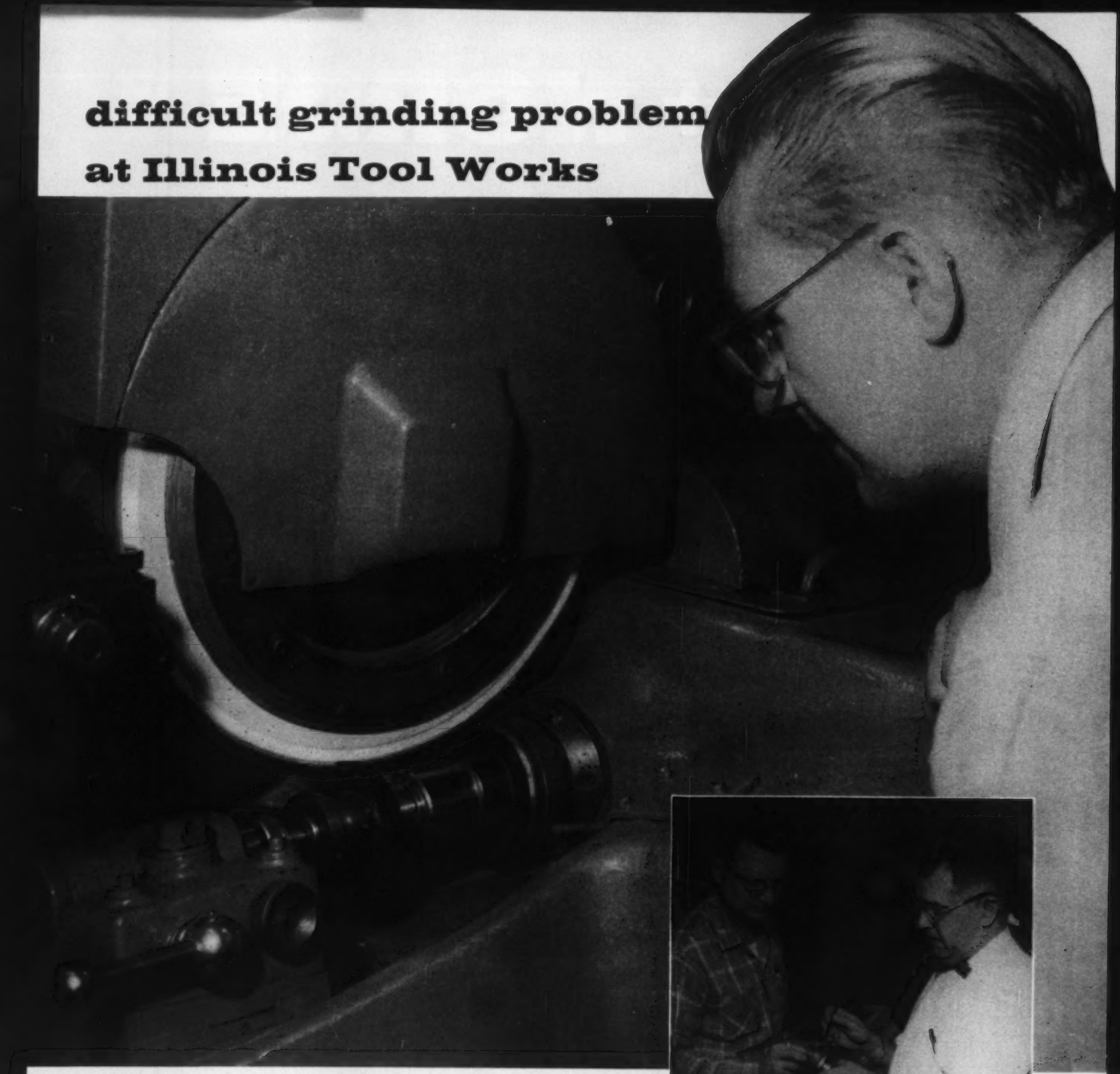
In attempting this grinding operation with competitive wheels, production was delayed by the wheels breaking down, glazing or mutilating the gear-teeth walls. It was impossible to maintain the involute shape of the teeth within specified accuracies.

SOLUTION – Bay State Abrasive Specialist Dean Strand was called in and went over every detail of the operation. He recommended a 16" diameter x 5/8" thick wheel with a highly friable aluminum oxide abrasive and a special Bay State vitrified bond modification, on Illinois Tool's gear-shaper-cutter grinding machine.

RESULT – No further problems on this gear finishing application! The wheel consistently maintains accuracies to within 1/10,000-inch and, in the words of Illinois Tool's Process Engineer Ed Leighton, "we wanted a wheel that would grind without glazing, that would stand up under these unique conditions, that would give us reasonable wheel life and would enable us to get real *production* out of our machine. Well, thanks to Dean Strand, we've got it."

Like Dean Strand, the Bay State Abrasive Engineer in your area is a trained expert. He backs up the work of the experienced men who represent Bay State's topflight distributors; and Bay State's research labs back them both with new ideas, techniques and materials. *Better grinding at lower cost . . . that is our business.*

difficult grinding problem at Illinois Tool Works



(*Above*) Operator Dale Jackson at his gear-shaper cutter-grinder equipped with a Bay State 16 x 5/8-inch aluminum oxide abrasive wheel. Grinding is done by side of wheel instead of face. 1/10,000" accuracy is consistently maintained.

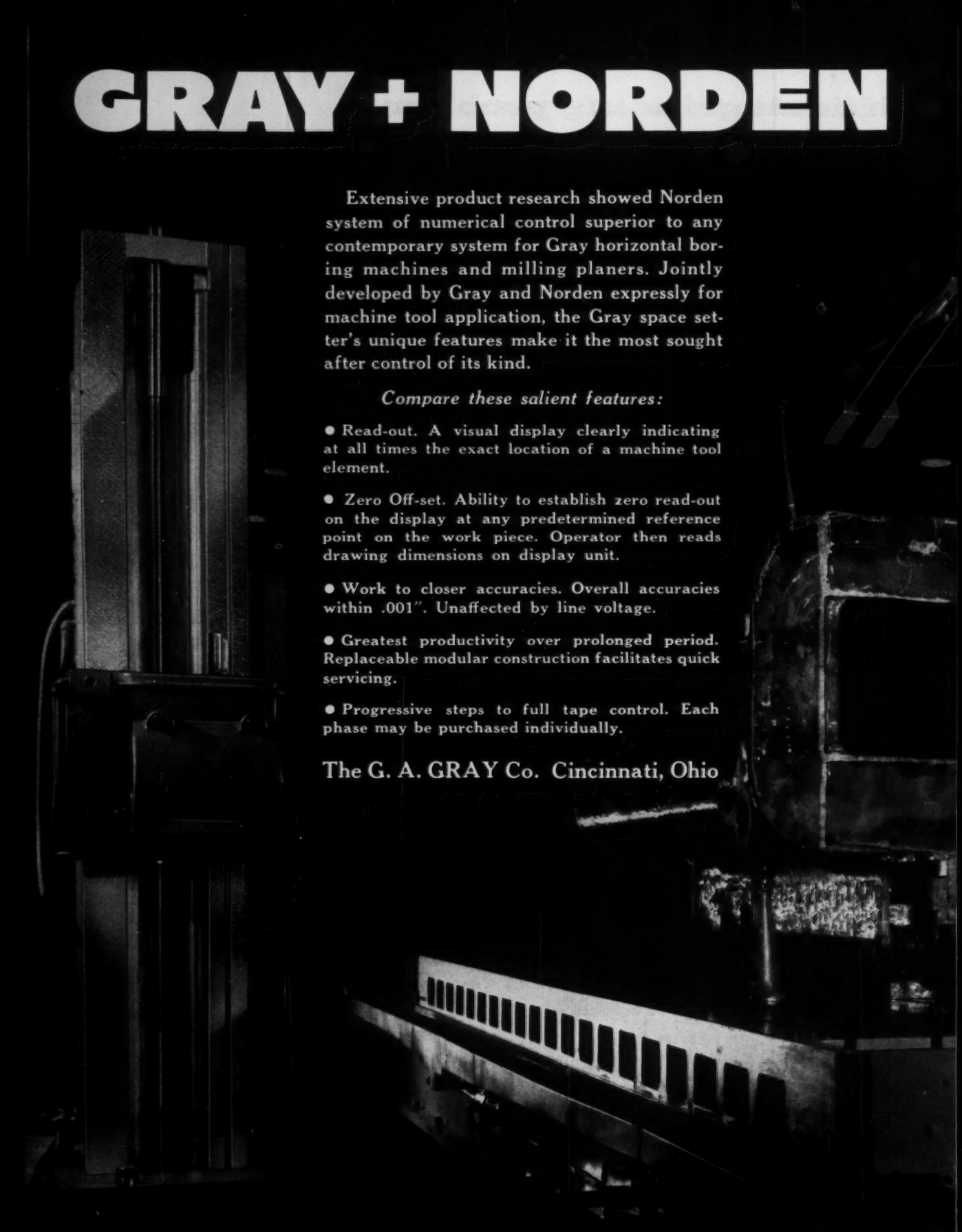
(*Right*) Process Engineer Ed Leighton and Inspector Leroy Wegner, of Illinois Tool Works, checking the tooth angle on a gear-shaper cutter. Extreme accuracy of the helical lead, and its involute shape, are vital to the completed product.

BAY STATE ABRASIVES

BAY STATE
WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

GRAY + NORDEN



Extensive product research showed Norden system of numerical control superior to any contemporary system for Gray horizontal boring machines and milling planers. Jointly developed by Gray and Norden expressly for machine tool application, the Gray space setter's unique features make it the most sought after control of its kind.

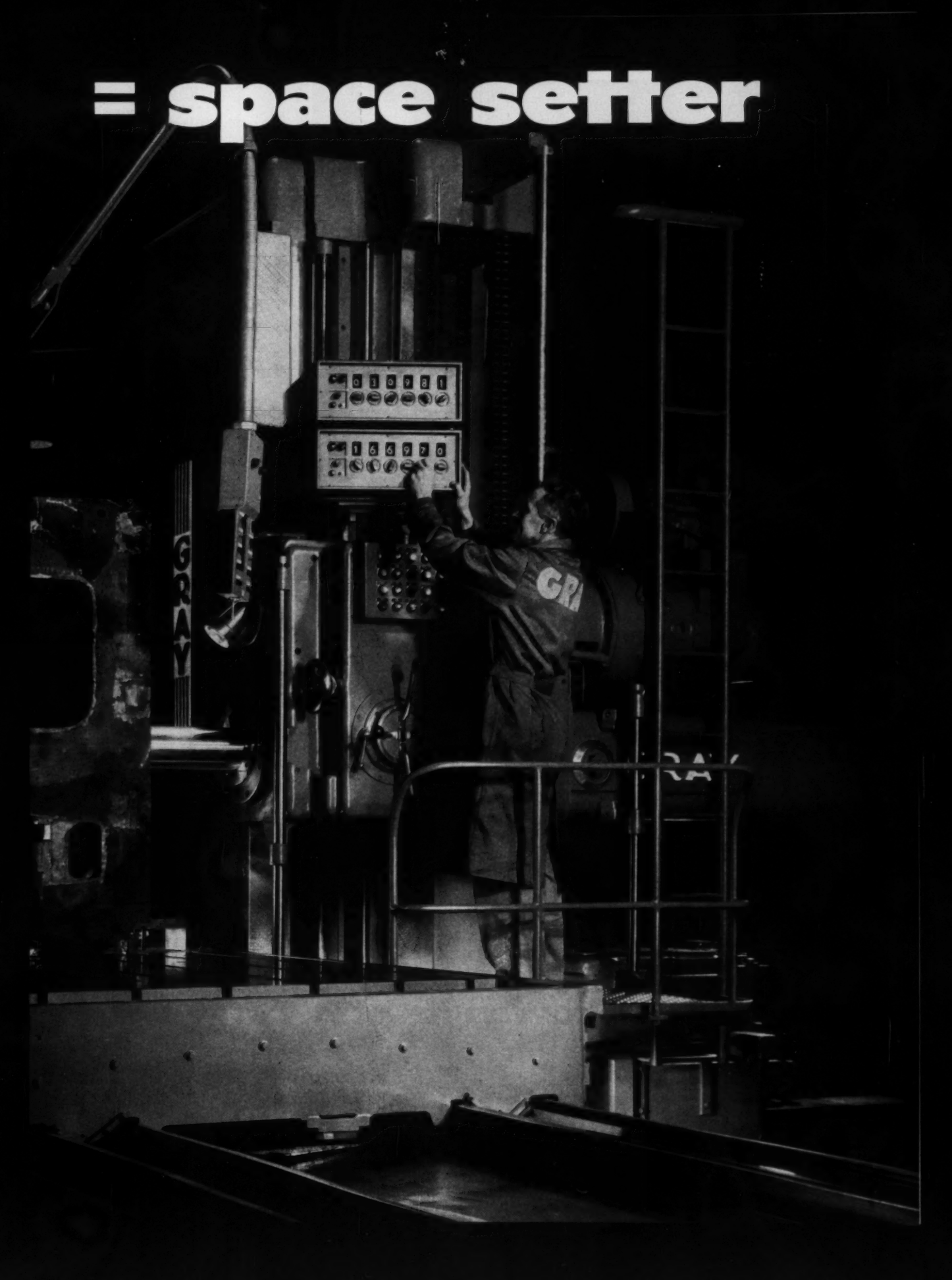
Compare these salient features:

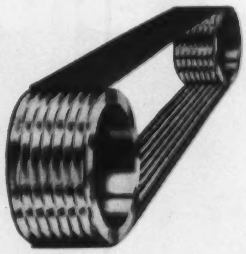
- Read-out. A visual display clearly indicating at all times the exact location of a machine tool element.
- Zero Off-set. Ability to establish zero read-out on the display at any predetermined reference point on the work piece. Operator then reads drawing dimensions on display unit.
- Work to closer accuracies. Overall accuracies within .001". Unaffected by line voltage.
- Greatest productivity over prolonged period. Replaceable modular construction facilitates quick servicing.
- Progressive steps to full tape control. Each phase may be purchased individually.

The G. A. GRAY Co. Cincinnati, Ohio

Builders of—Planers • Milling Planers • Planer type Milling Machines • Horizontal Boring Machines

= space setter





- NO MATCHING PROBLEMS
- MAINTAINS GROOVE SHAPE
- COMPLETE CONTACT-PRESSURE
- CONSTANT PITCH AND SPEED RATIOS
- LESS MAINTENANCE— LESS TAKE-UPS
- LESS BELT AND SHEAVE WEAR

Write for Bulletin M141

R/M POLY-V® DRIVE

MORE POWER...*in Less Space*
WITH MORE RELIABILITY

Designed for high volume forgings, this giant 2500 ton automated press developed by Erie Foundry Company is powered by a 250 HP Poly-V Drive. This new drive provides much higher horsepower capacity . . . delivers more dependable power per inch of drive width than ever before possible! Poly-V features a single unit V-ribbed belt across full width of the drive sheave—not an assembly of V-belts. Single unit belt design eliminates length matching problems — minimizes equipment down-time and belt replacement costs, runs cooler, smoother.

Just two cross sections of Poly-V Belt meet every heavy duty power transmission requirement. Ask your R/M Distributor for details about R/M Poly-V* Drive.

*Patented

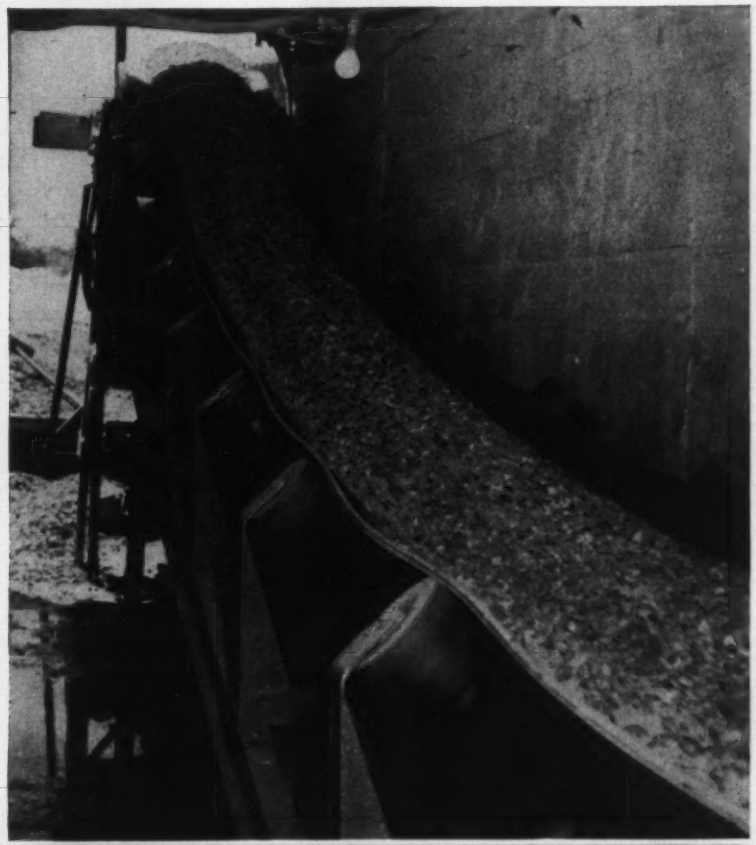
WHEN YOU CHANGE DRIVES . . .
CONVERT TO POLY-V AND BE SURE!

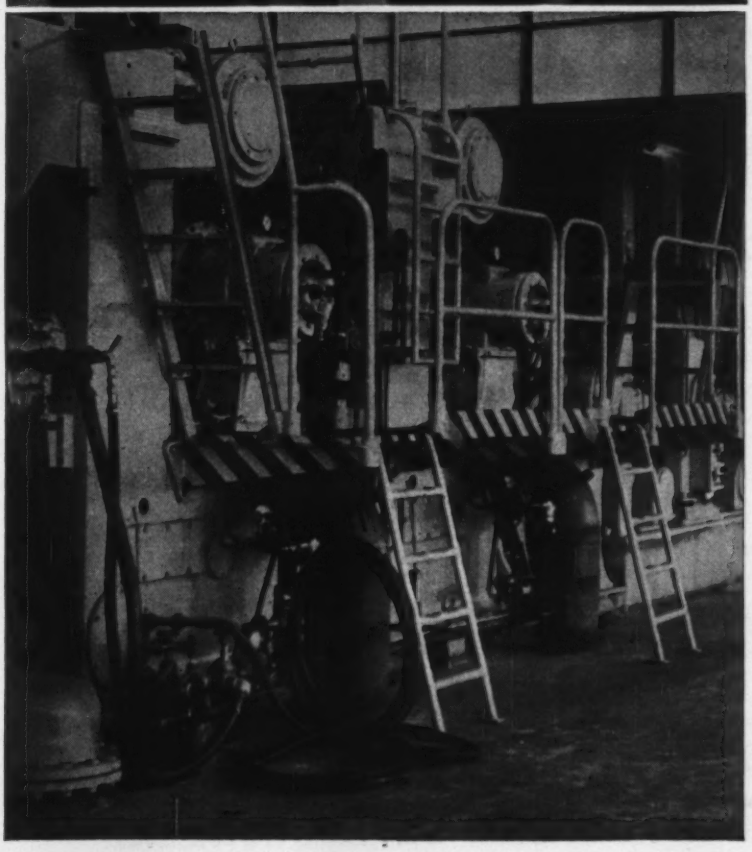
RM1030

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

RM

ENGINEERED RUBBER PRODUCTS . . . "MORE USE PER DOLLAR"





RAY-MAN CONVEYOR BELT

Engineered for 45° Idlers

- TRAINS NATURALLY
- TROUGHS DEEPLY
- HOLDS FASTENERS
- RESISTS IMPACT AND RIPPING
- REQUIRES NO BREAKER PLY
- DOUBLE COMPENSATION RELIEVES OUTER PLY STRESS
- EXCLUSIVE "XDC" LONG-WEAR COVER

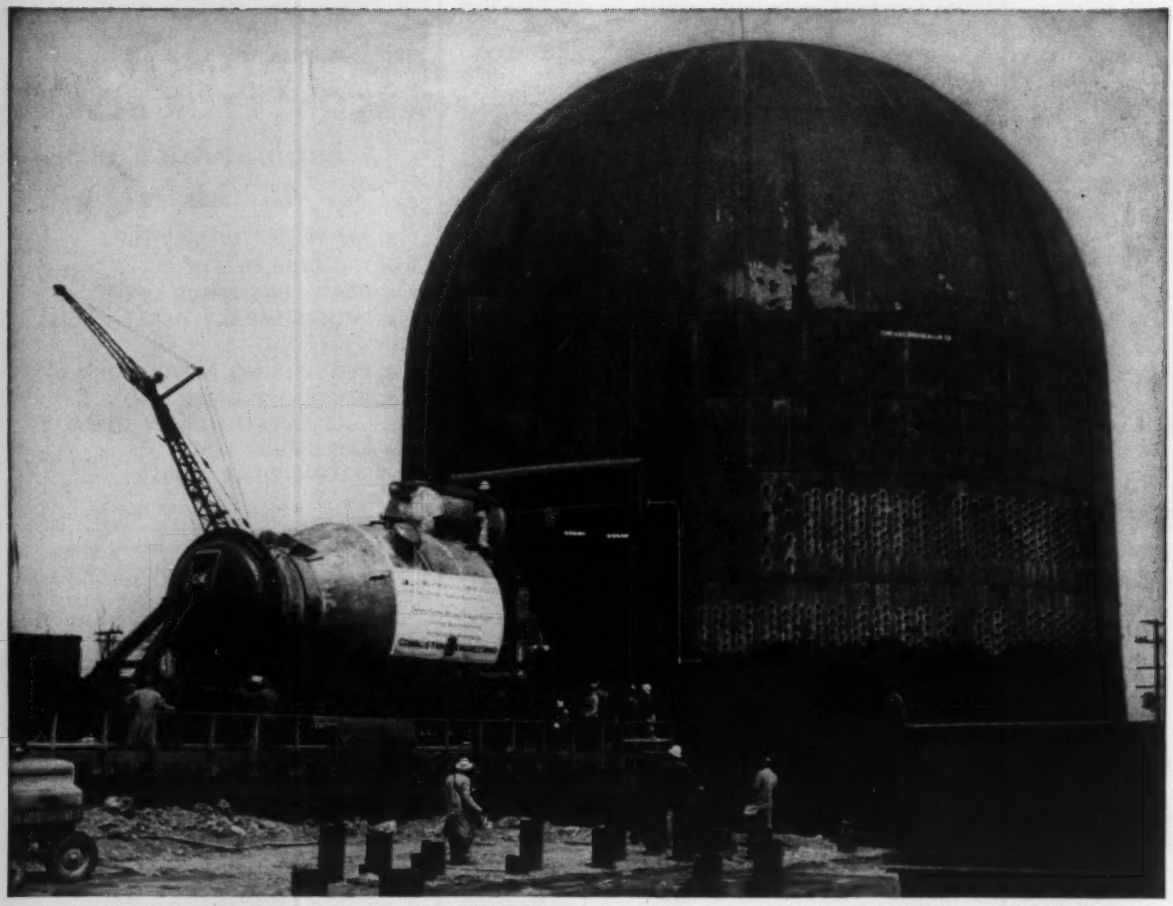
Every component of a Ray-Man Conveyor Belt is *precision proportioned* to give you a balanced belt construction, with as much as ⅓ longer life expectancy. It's the same as getting ⅓ more conveyor belt for your money. Further savings are possible, if you use 45° Idlers. Properly engineered, you can haul a fuller load, or install a narrower conveyor. Ray-Man is guaranteed against ply or cover separation at the hinge line where the 45° angle proves too sharp for regular belt constructions. Write for Bulletin M303.

HOMOFLEX HOSE

more flexible, weighs less than any hose for equal pressure

- SUPER-STRONG
- PRECISION BUILT
- NO PRE-SET TWIST—WILL NOT KINK
- INSEPARABLE TUBE-TO-COVER BOND
- UNIFORM INSIDE AND OUTSIDE DIAMETERS
- EASIER, SAFER COUPLING

Strong, lightweight, and "flexible as a rope"—Homoflex is the easiest handling hose and lasts longer. Made in types for air, water, other fluids and gases. Ask about other types of R/M rubber hose for your job applications. Write for Bulletins M620 and M694.



Atoms for Peace. This dome houses the 91-ton reactor vessel made of nickel-containing stainless steel for the new Enrico Fermi Atomic Power Plant on the shore of Lake Erie near Monroe, Michigan. Detail design and construction of the reactor vessel was done by Combustion Engineering, Inc. Plant will be built and operated by Power Reactor Development Company from designs supplied by Atomic Power Development Associates, Inc.

Atomic reactor "breeds" its own fuel

Stainless steel vessel must withstand high temperatures and corrosives

The world's largest full-scale nuclear reactor of the "fast-breeder" type is now being built. It may well answer the question:

> *When will atomic power be competitive with conventional methods of producing electric power?*

As the term "fast-breeder" indicates, the atom-splitting process is maintained by so-called *fast* or high-energy particles. It produces more nuclear fuel than it consumes. The fast-breeder actually turns out a kilogram and a fifth of new fuel for each kilogram it burns up!

The "breeding" takes place in a 36-foot high pressure vessel. Here, the high-energy particles (neutrons) travel at speeds of thousands of miles per second to keep the atom-splitting chain reaction going.

Accent on safety. A major objective was to make this reactor vessel safe. That called for a lot of highly specialized work.

It also called for a rugged metal: one capable of withstanding the tremendous heat given off in nuclear fission, and of bearing up under the temperatures and corrosives encountered. The final choice? Strong, corrosion-resisting Type 304 stainless steel. It's a stainless steel that contains Nickel – one of the big reasons for these superior properties.

How to "fast-breed" ideas. Problems involving reactor materials may never be a concern of yours. But you can run into *metal selection problems* involving corrosion, pressures, high temperatures and other destructive conditions almost any time. When you do, remember there is a good chance that a steel containing Nickel will provide the properties you want. Let us help you find out.

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street New York 5, N. Y.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Universal Engineer Tractor

(Steel bulldozer that flies)

"What we want is an earthmover that can do the work of conventional scrapers, dozers, and tractors . . . but which weighs only half as much . . . can be parachuted into a combat area, or flown in by helicopter!"

Army ballastable all-purpose tractor, manufactured for Barnes & Reinecke, Inc., by Hendrickson Manufacturing Company, Lyons, Illinois, is built light enough to be transported by air through the use of USS MAN-TEN High-Strength Steel and USS "T-1" Constructional Alloy Steel.

That was the demand made of the U. S. Army Engineer Center, Ft. Belvoir, Va. It was fulfilled through ingenious design using welded USS MAN-TEN High-Strength Steel and super-strength USS "T-1" Constructional Alloy Steel.

The ballastable all-purpose tractor weighs approximately 16,000 lbs. empty; 32,000 lbs. loaded. The weight reduction problem was solved by designers from Barnes & Reinecke, Inc., Chicago engineers. They designed the tractor in three sections—front end, scraper bowl and rear end.

The scraper's yoke, bowl frame, apron ejector, bowl skin and drawbar were welded from 3,370 pounds of "T-1" Steel, which has a minimum yield strength of 100,000 psi. Maximum working stresses on these parts were designed to 60,000 psi, more than triple the working stress that would be used with carbon steel. This permitted maximum weight reduction while retaining strength.

By using USS MAN-TEN High-Strength Steel in the dozer blade and rear-axle housing, they obtained the necessary strength with a reduction in plate thickness from the usual $\frac{1}{2}$" and 1" down to $\frac{1}{8}$" and $\frac{1}{4}$". USS MAN-TEN steel parts totaling 1,350 pounds were designed to a maximum weight reduction while retaining strength.

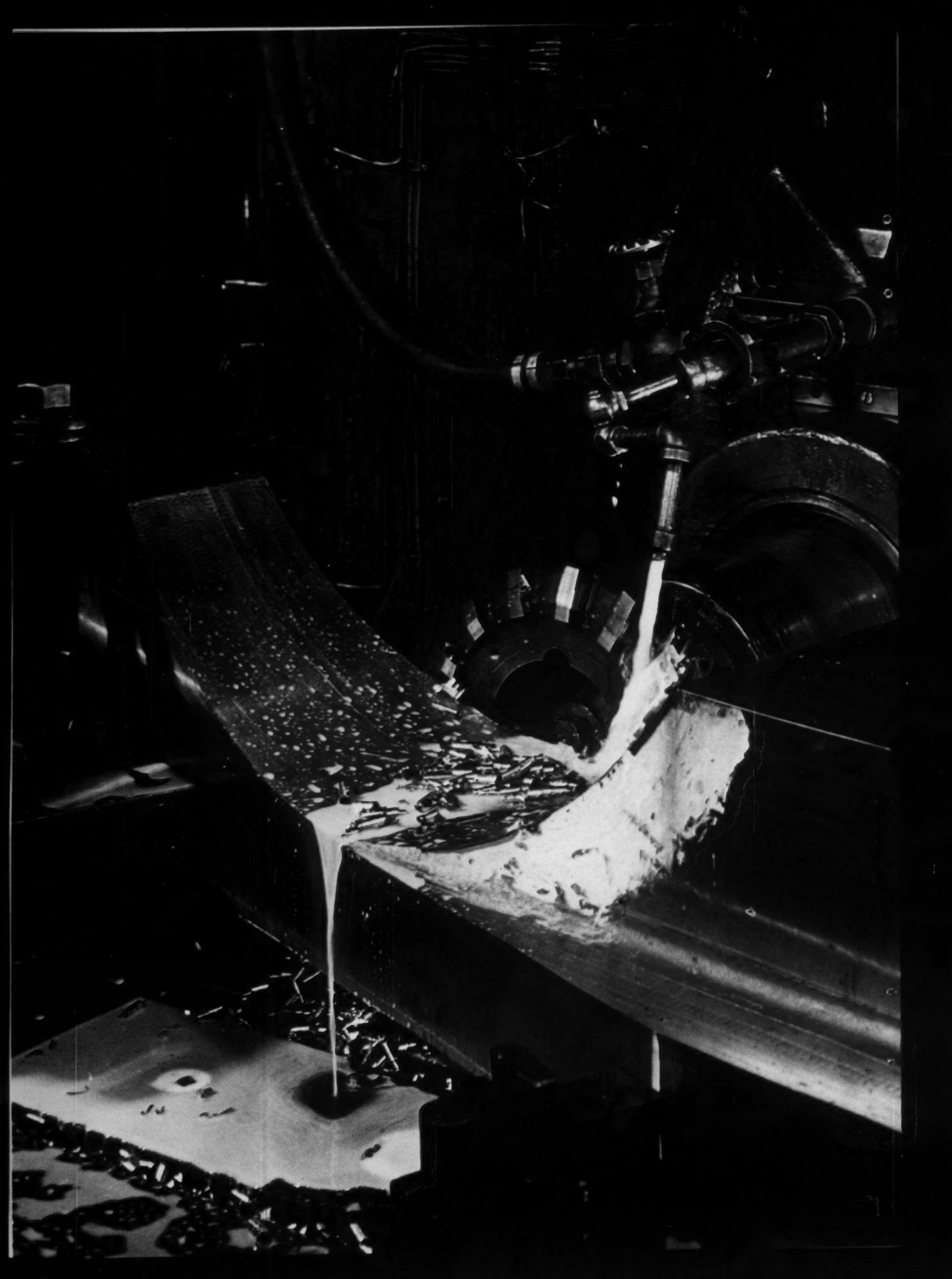
The machine shown, a feasibility prototype weighing 8 tons, will be superseded by a $10\frac{1}{2}$-ton production unit powered by a diesel engine instead of an aircraft-type engine. This new item is designed to be conventionally transported by air, and it can be air dropped.

For other military vehicles, United States Steel makes extremely tough, rolled alloy steel armor plate in addition to a complete line of high-strength steels, stainless steels and carbon steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS, MAN-TEN and "T-1" are registered trademarks

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company
United States Steel

USS



This forging may cradle the greatest source of energy on earth

One of the great scientific investigations of all time is now in progress, as we strive for a controlled *fusion* reaction. If we succeed, man will be able to generate a limitless amount of energy using deuterium fuel, a hydrogen isotope, available in inexhaustible quantities from the sea.

Princeton University carries on the study with their Stellarator-type experimental devices. The Model-C Stellarator Facility now nearing completion will cost $35 million and consists of an 8-inch-diameter, 40-foot-long, racetrack-shaped tube to control the reaction. Required ignition temperature is in the order of 100 *million* degrees. Any solid material will evaporate at that temperature, so the hot ionized gas will be confined in a magnetic field of *50,000* gauss in the Model-C Stellarator. The equipment is supported by USS Quality Forgings of Type 305 Stainless Steel.

Altogether, U. S. Steel supplied 17 of these stainless steel forgings, fully annealed, to Allis-Chalmers Manufacturing Company, major contractor for the new Model-C Stellarator.

The steel for the forgings was forged, heat-treated and machined at U. S. Steel's Homestead Plant. Each forging measures 60¼″ long, 21¼″ wide at the base, 15⅝″ high and weighs about 2,450 pounds rough machined.

United States Steel makes many forgings for the nuclear industry. Here, a team of *experts* supervises and *controls every step* of forging production. This same team can handle your forging requirements. If you would like additional information about USS Quality Forgings, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

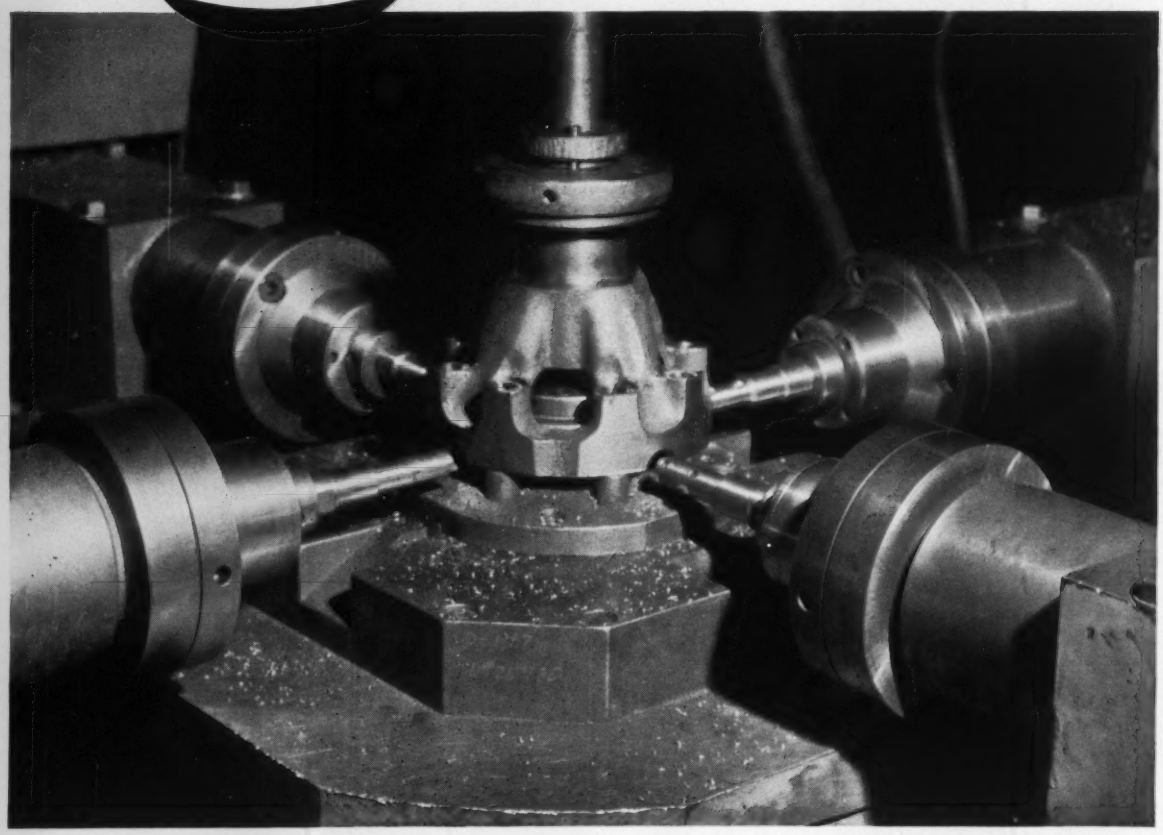
USS is a registered trademark

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Export Company

United States Steel

USS

VR-65 Tungsten-Free Carbide



4 times more production!

The job is rough and finish boring half holes in a C5 steel forging. The machine is a 4 way Cross Bore operating at a speed of 2360 rpm and 700 sfpm; with a feed of .005 and a .025 to .030 depth of cut.

VR-65 tips are brazed to boring tools by conventional methods.

On this interrupted cut, VR-65 produced from 80 to 100 pieces per grind as compared to 10 to 25 pieces by previous conventional tungsten-base carbides.

VR-65 is the first of a new generation of carbides to provide ultra high speed machining on *all* types of steel . . . see your V-R representative for details or write:

CREATING THE METALS THAT SHAPE THE FUTURE

VASCOLOY-RAMET

824 MARKET ST WAUKEGAN, ILLINOIS

C-786

BLAW-KNOX

Blaw-Knox designs and builds slabbing-blooming mills in a complete range of sizes in universal and high lift types. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pa.

46 x 90 inch Universal Slabbing Mill at the Fontana Works of Kaiser Steel Corporation.

Which of these did you use today?

Alarm wake you this morning? Stove timer work all right? Did you drive to work . . . take a business trip by air . . . press a light switch . . . use a dictating machine . . . or home workshop motor? Then you, or someone in your home or business, used a spring. With a product-mix like this it's practically certain that we enter your daily living, tucked anonymously away in nationally known and respected brands of all sorts of articles.

Write for a copy of "How to Solve Your Spring Design Problems" to learn how early consultation with the spring manufacturer results in improved design and performance.

Associated Spring Corporation

General Offices: Bristol, Connecticut

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they turn in top performance to turn out top results

improved grinding action and longer wheel life for faster weld grinding... SIMONDS NEW SERIES 60

DOUBLE XX

Reinforced Resinoid
DEPRESSED CENTER WHEELS

Better than ever for long wheel life . . . faster by far for economical weld grinding. This efficiency is yours with Simonds Series 60 Double XX Wheels. New manufacturing methods give this new series of reinforced resinoid bonded wheels superior grinding action. Each wheel has maximum amount of abrasive grain. Doubly reinforced for extra strength and safety. Lightweight rigid type for general use. Unexcelled for grinding welds. You can also get slightly flexible Fibrex Wheels for lighter jobs and stainless steel. Order from your Simonds distributor.

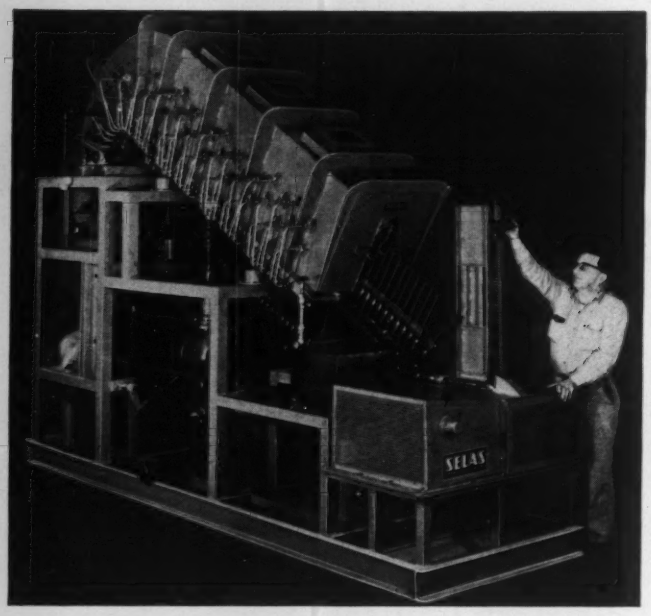
Send for Bulletin ESA 244

SIMONDS ABRASIVE CO.

PHILADELPHIA 37, PENNA.

COUNT ON / YOUR SIMONDS DISTRIBUTOR FAST SERVICE • LOCAL STOCKS

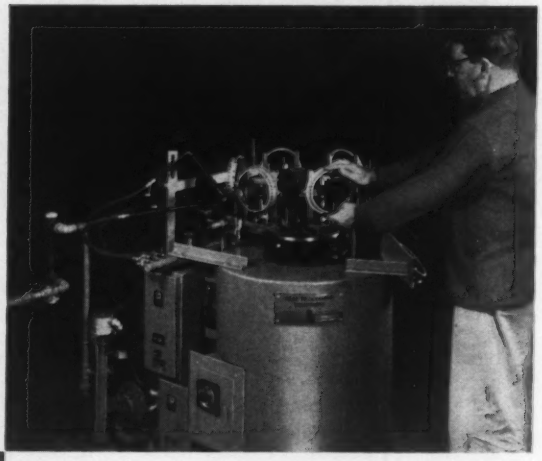
WEST COAST PLANT: EL MONTE, CALIF.—BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO SHREVEPORT — IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC

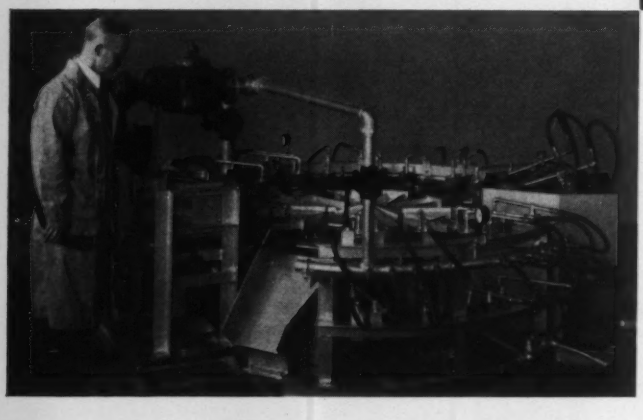


FORGING: Continuous unit fits compactly into production line to heat alloy steel bars for forging into C-shaped rail anchors. Production is synchronized with the forging bulldozer, up to 620 bars per hr. Inventory of work-in-process is ⅓ to ¼ of previous equipment . . occupies 20% less floor space . . reduces scale 95%. Precise heating assures consistently uniform grain structure and hardness.

Here's How Industry Cuts Costs

BRAZING: Compact machine automatically silver brazes Carboloy cutter to stainless steel shredder ring used in garbage disposal units. Precise fixturing, localized high-speed heating and automatic unloading permits one operator to produce up to 200 pieces per hr. . . Completely shop-assembled at Selas, unit was installed in customer's plant, ready for production operations, within hours.





SELECTIVE HARDENING: End portions of brake shoe webs are hardened to create a more durable product. An indexing conveyor brings the two ends of webs under Duradiant burners. Designed for automatic loading, the machine heats, quenches, tempers and mechanically unloads the selectively-hardened work pieces. Service life of webs has been extended, costs have been reduced.

is your reward

ANNEALING. Six-station dial conveyor automatic machine anneals a narrow band on stainless steel auto hub caps. Workpieces rotate above burners, bringing 2-in. wide band to 1800 F in 30 sec. Production is 600/hr. Only 6 ft 6 in. in diam., unit is located directly in the press shop production line.

. . . Improves Product Quality

with SELAS heat processing equipment

The installations on these pages demonstrate how Selas automatic heat processing equipment

- cuts operating costs
- increases production rates
- minimizes in-process inventory
- reduces labor requirements
- saves valuable floor space
- improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. Problems usually associated with divided responsibility are avoided since Selas starts-up and services every machine it designs and builds.

Selas automatic or semi-automatic heat processing equipment can help you produce better products at lower costs. At your convenience—without obligation to you—a Selas field engineer would welcome the opportunity to survey your requirements.

For this free, personal service, or for literature on any of the heating operations shown here, write Mr. W. B. Troupe, General Industry Div., Selas Corporation of America, 15 Dreshertown Road, Dresher, Pa.

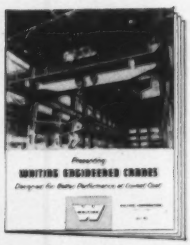
EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S. A., Pregny, Geneva, Switzerland. **INTERNATIONAL REPRESENTATIVES AND LICENSEES:** CAMBODIA, FORMOSA, KOREA, LAOS, VIETNAM—Cosa Export Co., Inc.; AUSTRIA, GERMANY—Indugas, Essen; JAPAN—International Machine Co., Ltd., Tokyo; FRANCE—Societe Exploitation de Produits Industriels, Paris.

SELAS CORPORATION OF AMERICA
DRESHER · PENNSYLVANIA

HEAT AND FLUID PROCESSING ENGINEERS development · design · construction

TWO-DECKER TRAFFIC SPEEDS BILLET HANDLING

Ingenuity pays off in this Whiting crane installation at Simonds Saw and Steel Company's Steel Mill, Lockport, New York. High up, a 15-ton Tiger Crane rushes big billets to a forging press. Below it, a 5-ton gantry crane carries off the press's output of reduced billets. The 2 cranes pass each other repeatedly, with no delay, no rehandling. Two separate traffic levels solve a complex traffic problem and keep materials on the move. Use of a gantry crane at the lower level substantially reduces initial equipment cost. You get inventive, personalized crane service from Whiting . . . a product of 76 years of crane experience. Call in Whiting for all your overhead materials handling needs. For more information on standard and custom Whiting cranes, send for Bulletin 80, "Whiting Engineered Cranes." *Whiting Corporation, 15601 Lathrop Ave., Harvey, Illinois*

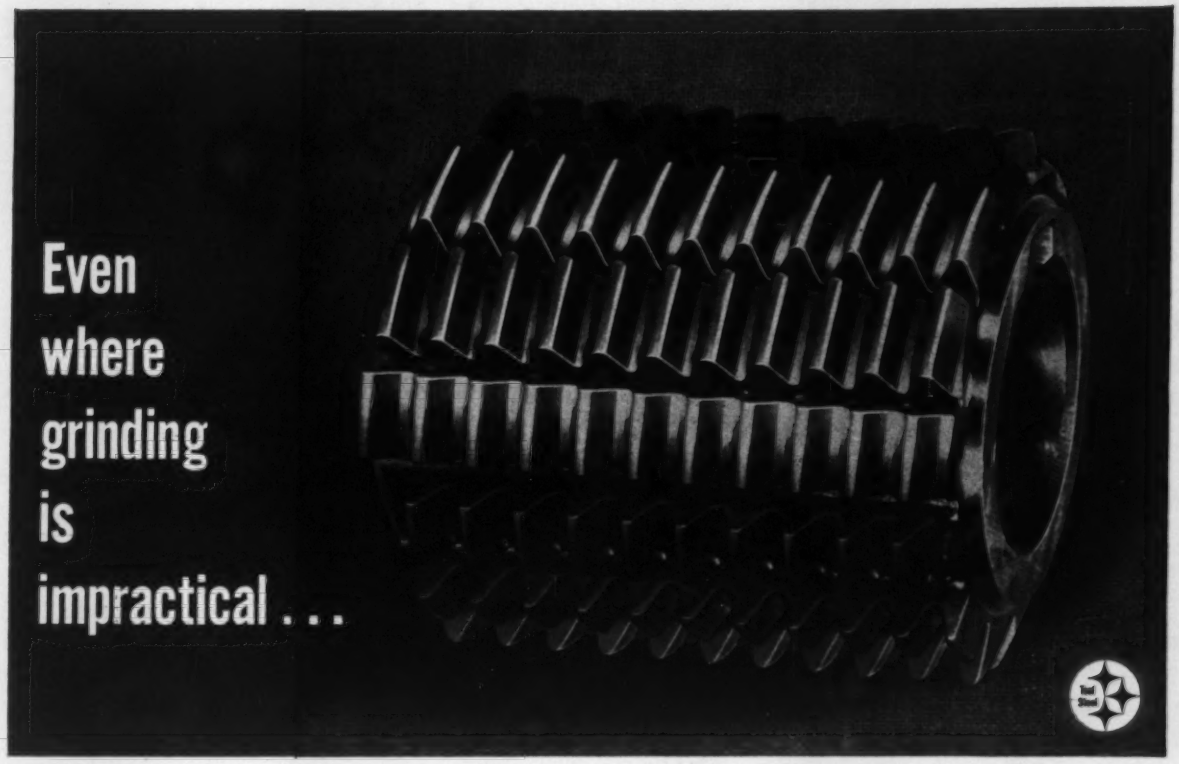


87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

CRANES

WHITING

MANUFACTURERS OF CRANES; TRAMBEAM® HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES®; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT



Dependable DESEGATIZED® XL® High Speed Steels

. . . pacesetters for machinability since 1953

For over 7 years, toolmakers have recognized the superior machinability of Latrobe's Desegatized XL high speed steels. They note a great reduction in surface finishing problems involving hobs, cutting tools and other components. Even where finish grinding is impractical, XL steels consistently meet requirements because . . .

XL high speed steels are made by the Desegatized process of manufacture—a process involving unusual melting techniques employed by Latrobe since 1946. This process guarantees full structural uniformity of the steel—no harmful carbide segregations . . . freedom from porosity . . . and an even dispersion of the *proper* amount of alloy sulphides that promote better machinability. As a result, tools made of XL steels not only possess better machined surfaces—they are consistently tougher, respond predictably to heat treatment and wear longer.

Latrobe regularly produces over 18 grades of Desegatized XL high speed steels, many stocked for prompt delivery from warehouse and mill stocks. For your next tool steel application . . . call Latrobe! Our sales engineers will be pleased to provide technical assistance to help you select the *right* steel for your application.

Manufactured by skilled American labor. . . .

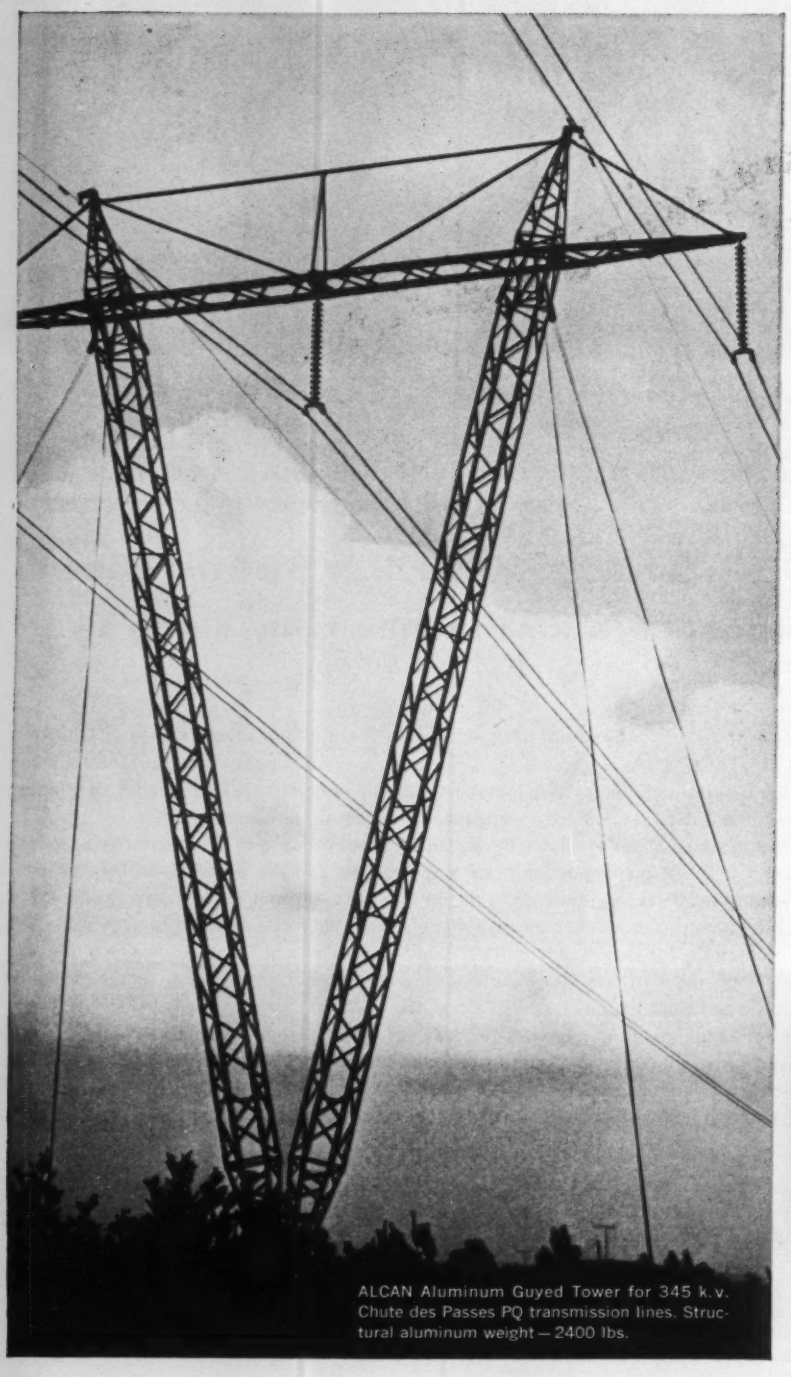
LATROBE
Metalmasters

LATROBE STEEL COMPANY
LATROBE, PENNSYLVANIA

BRANCH OFFICES and STEEL SERVICE CENTERS: BOSTON • BUFFALO • CHICAGO CLEVELAND • DAYTON • DETROIT • HARTFORD • LOS ANGELES • MIAMI • MILWAUKEE NEW YORK • PHILADELPHIA • PITTSBURGH • SAN LEANDRO • TOLEDO

From Aluminium Limited research—an important

The ALCAN



ALCAN Aluminum Guyed Tower for 345 k.v. Chute des Passes PQ transmission lines. Structural aluminum weight—2400 lbs.

- Designed for installation on level ground . . . mountain or in swamp
- Weight savings of up to 80% due to the combination of efficient aluminum design and the guyed-tower principle
- Lightweight components are readily transported by panel truck, motorboat, helicopter . . . easily carried by hand
- Tower can be raised by one crew in minutes!
- Offers all the maintenance economies of aluminum

When used in the "V" arrangement only one footing and four inexpensive guy anchorages are required—eliminating the need for precision in footing work. Side-hill problems of leg extensions are nonexistent.

new application for aluminum extrusions

Aluminum Guyed Tower

—a revolutionary new high-voltage transmission structure that "makes molehills out of mountains"

The ALCAN Aluminum Guyed Tower brings substantial economies to the construction of high-voltage transmission lines.

The new unit—designed for "V" or parallel leg erection—has been created by ALCAN engineers to take full advantage of aluminum. The resulting combination of lightweight metal and the guyed-tower principle has many advantages over rigid conventional types.

Versatile Application

Particularly well suited for single-circuit lines, the ALCAN Guyed Tower is adaptable to all types of terrain without the additional costs normally expected with adverse footings and side-hill conditions.

Economical Installation

A primary advantage of the new tower is a weight reduction of up to 80% less than the rigid steel principle. This results in lower installed costs through lower transportation expenses . . . lighter erection equipment . . . simpler footing alignments . . . reduced erection time.

Easily Handled

All ALCAN Guyed Tower components can be delivered to the erection site with no need for special carriers or heavy lifting gear. Lightweight 20-foot leg sections weighing less than 200 pounds and major cross-arm pieces are readily handled by workmen without need for auxiliary equipment. This permits inexpensive yard assembly of a major portion of the tower before distribution to the tower sites.

Simple Assembly

Depending on the height required, only six to ten standard leg sections and a cross-arm go to make up each tower . . . sections can be quickly joined during ground assembly of units.

Single or Twin Base Erection

The ALCAN Aluminum Guyed Tower can be erected on a single base in the form of a "V" or on twin bases as a portal type, whichever style best suits conditions of terrain and right of way.

Fully Tested Design

Ultimate load tests on components as well as on complete towers have been carried out to establish the behavior of this arrangement and to confirm design principles. Special footings and guy anchorages located in marshland, loose sand, packed earth and rocky terrain have also been tested to full design loadings.

This development and test program resulted in the installation of four guyed towers in the ALCAN 345 k.v. Chute des Passes transmission system. Ranging from 76 feet to 96 feet from base to cross-arm, two are located on rock and two were installed in a swamp.

Uses Special High-Strength Alloy

The new ALCAN Guyed Tower is made of another Aluminium Limited development—ALCAN B51S aluminum alloy, which keeps costs low through a combination of high structural strength and good formability. Like all aluminum structures—maintenance costs are minimum.

Aluminium Limited

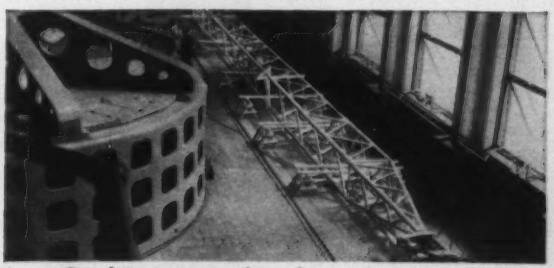
ALCAN

INQUIRIES FOR ADDITIONAL INFORMATION SHOULD BE ADDRESSED TO

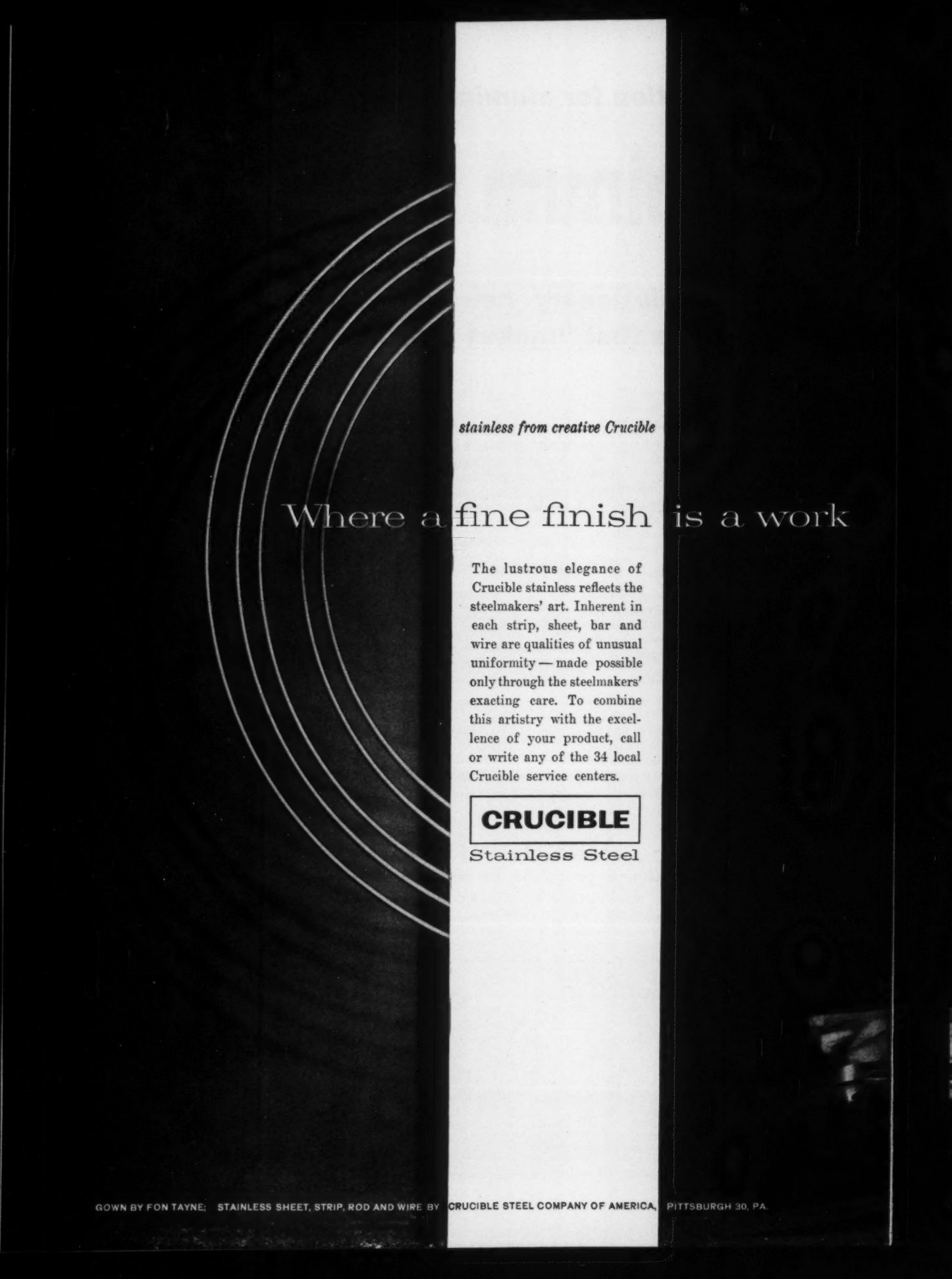
Aluminium Limited Sales, Inc.—630 Fifth Avenue, New York 20, N. Y.

CLEVELAND • CHICAGO • LOS ANGELES • DETROIT • ATLANTA • ST. LOUIS

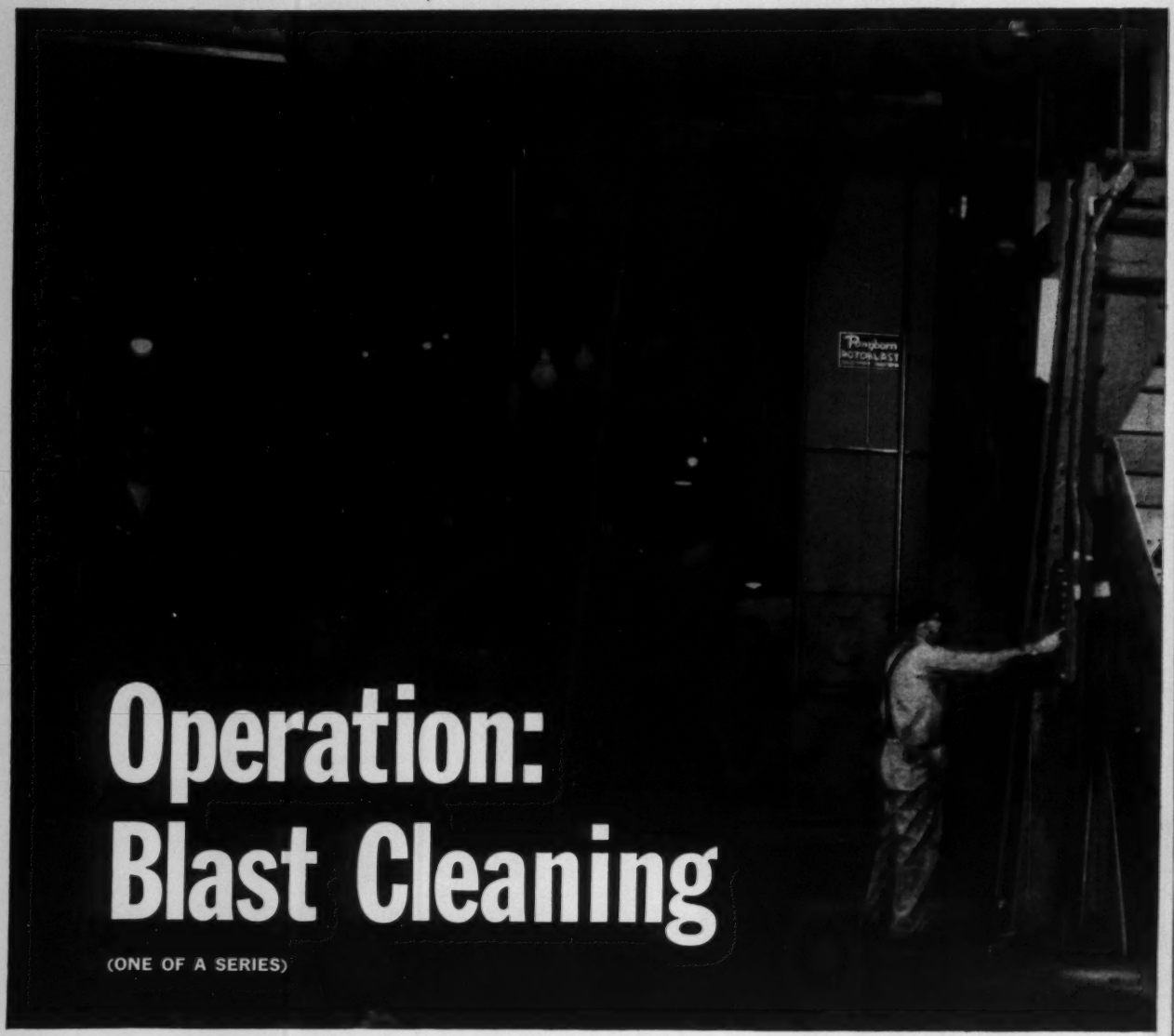
ALCAN Aluminum Guyed Towers over 100 feet in height have been raised in less than seven minutes from preassembled position on ground using standard pole-line truck and rigging. In rough terrain tower can be erected in large lightweight sections.



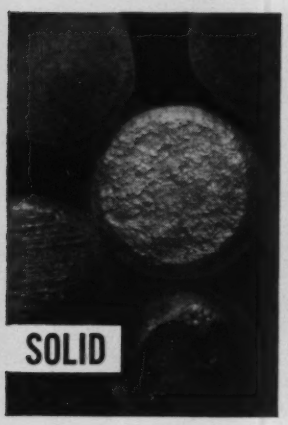
ALCAN Guyed Towers were subjected to tests by Aluminium Limited at Isle Maligne, Quebec, Powerhouse, with single legs up to 96 ft. in length, under loads of 93,000 lbs.


stainless from creative Crucible
Where a fine finish is a work
The lustrous elegance of Crucible stainless reflects the steelmakers' art. Inherent in each strip, sheet, bar and wire are qualities of unusual uniformity — made possible only through the steelmakers' exacting care. To combine this artistry with the excellence of your product, call or write any of the 34 local Crucible service centers.
CRUCIBLE
Stainless Steel
GOWN BY FON TAYNE; STAINLESS SHEET, STRIP, ROD AND WIRE BY CRUCIBLE STEEL COMPANY OF AMERICA, PITTSBURGH 30, PA.

of art



Pangborn Rotoblast proves itself again



Carrier Corporation, Syracuse, N.Y.—Pangborn Rotoblast cleans so quickly it has cut cleaning department labor costs 30% to 40% . . . saving $15,000 a year.

Master Electric Company, Dayton, Ohio—Two 12 cu. ft. Rotoblast Barrels with automation reduce labor costs by 50%—save $15,000 a year in manpower alone! Clean 33 tons of gray iron castings a day with ease.

Meadville Malleable Iron Co., Meadville, Pa.—Pangborn Roto-

And Rotoblast Steel Abrasives

In foundries, forges, steel and metal working plants all over America, premium quality Rotoblast Steel Shot and Grit are replacing other metal abrasives as they *prove* their ability to blast clean at lower cost. Lansing Drop Forge Co.—a typical

Typical Rotoblast Barrel, Ft. Pitt Steel Castings Co., McKeesport, Pa.

...and again...and again...and again!

blast cut 24 man-hours daily to 15 . . . cleans loads three times as large in half the time.

Ingersoll Rand Co., Painted Post, N.Y.—Pangborn Rotoblast cleans 74,000 lbs. of castings per day, cuts cleaning time in half and substantially reduces costs.

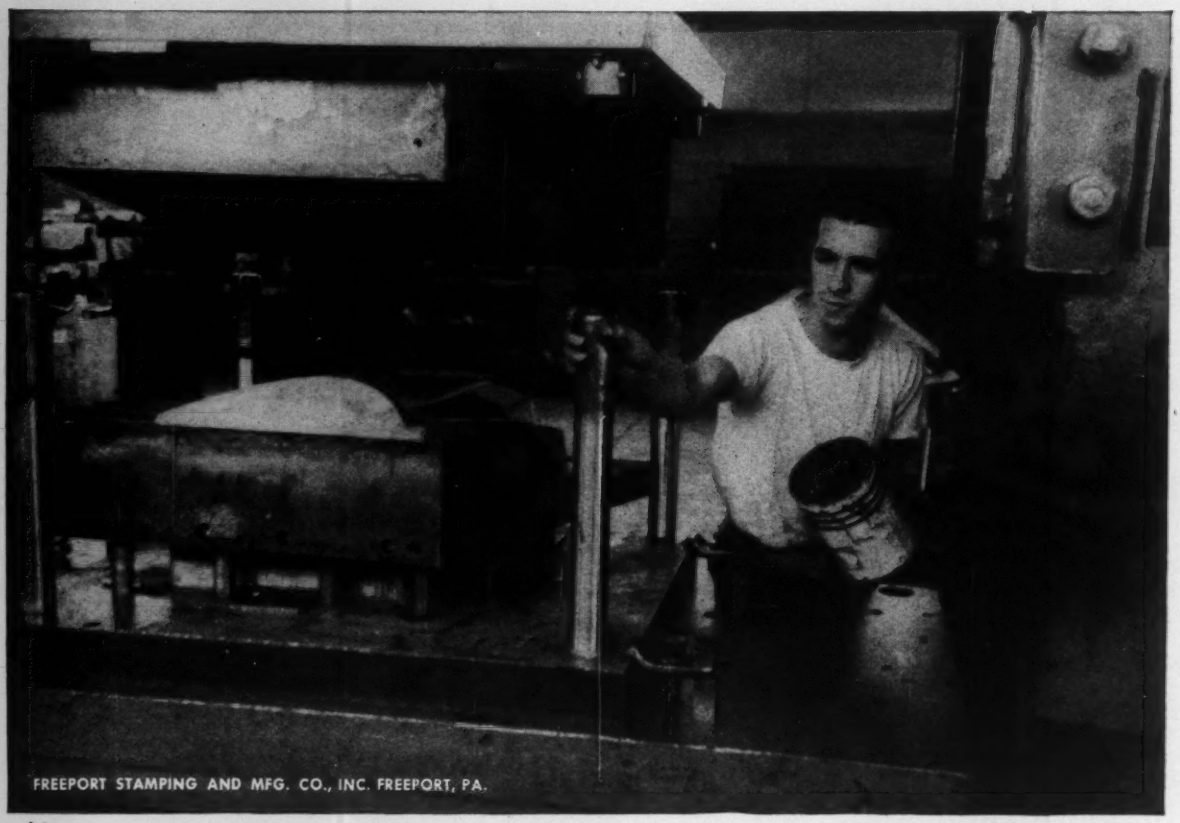
Buckeye Iron & Brass Co., Dayton, Ohio—Pangborn Rotoblast is automated to reduce labor requirements even further, cuts 15 minutes blast time to just 4½.

Results like these explain why two of the world's leading automotive manufacturers have just ordered *nine* 32 cu. ft. capacity Rotoblast Barrels! If your problem involves blast cleaning, talk to your Pangborn man or write PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning, Vibratory, Dust Control Equipment—Rotoblast® Steel Shot and Grit.®*

prove their value, too!

user—switched to Rotoblast S-390, cut abrasive cost by 23%. An Ohio foundry cut shot consumption from 27 lbs. per wheel hour to 7.8 lbs. with Rotoblast S-330. Let us show you what Rotoblast abrasives will do for you.

Pangborn
OF HAGERSTOWN



FREEPORT STAMPING AND MFG. CO., INC. FREEPORT, PA.

"Die Guides Needed Grease Every Few Hours... Cities Service Trojan HM Stays for Days"

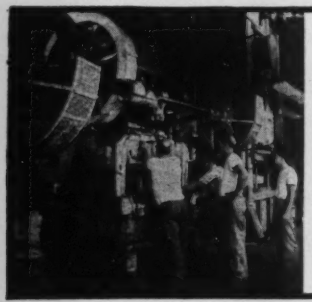
Freeport Stamping has built a reputation for ultra-precision in its stampings. But one annoyance kept bothering the production department . . . die guides had to be lubricated every few hours or they started to bind and gall. Cities Service Lubrication Engineer, Robert Vey, suggested a change to new Trojan HM Grease, containing 3% molybdenum disulfide.

The very first application of Trojan HM kept the die guides operating smoothly for three days instead of the usual three hours. Cities Service Trojan HM Grease is a new lithium base lubricant combining high temperature characteristics with excellent low temperature pumpability, good water-resistant properties and high stability. New Trojan HM Grease is a tenacious lubricant with a plating action that extends the period between servicing.

If you have a grease problem, Cities Service is eager to serve you with free technical assistance and a full line of special and multi-purpose greases. For full information call your nearest Cities Service office or write: Cities Service Oil Company, Sixty Wall Tower, N. Y. 5, N. Y.

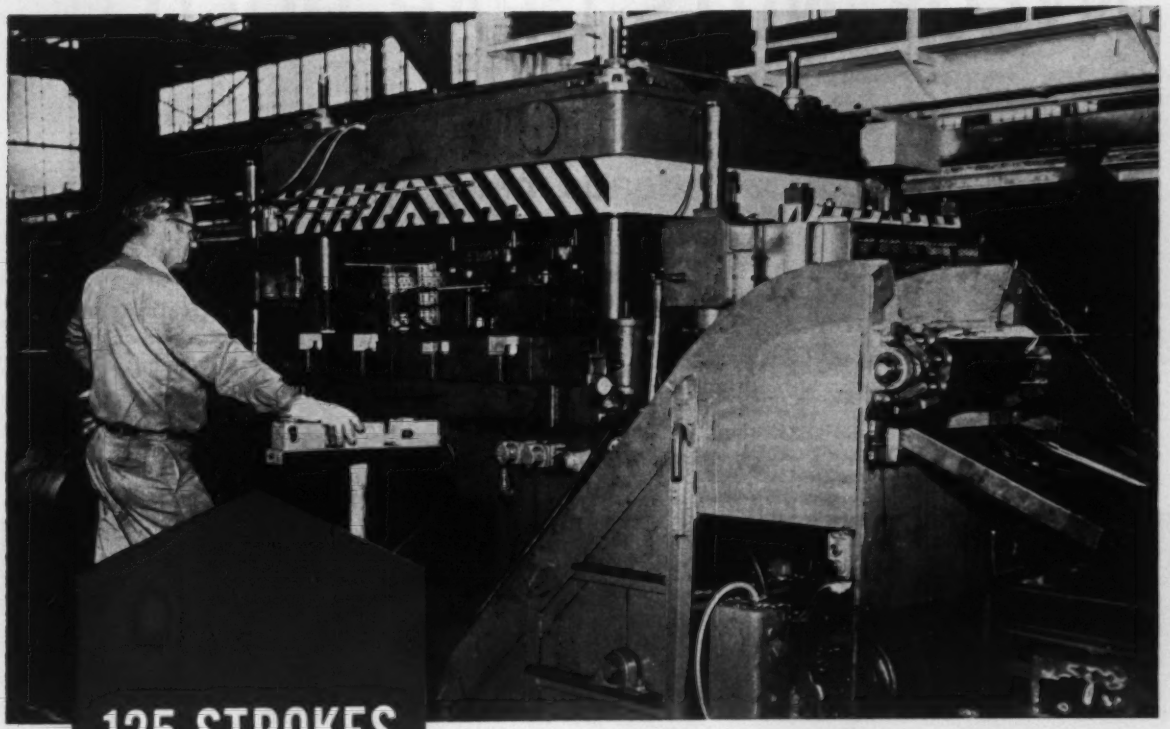
CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



All Eleven presses at Freeport Stamping operate with Pacemaker #3 hydraulic oil. Pacemaker is a multi-use quality lubricant that helps reduce inventory. Freeport also uses Pacemaker in machine tools, and electric motors.

Compound Curves with one draw are possible with Cities Service Drawing Compound. Automobile parts being made for two major manufacturers, are used in a visible spot so they must be free of die marks as well as precision drawn.



This Henry & Wright Double Crank Dieing Machine has been in constant use for three years with negligible maintenance costs. It is used on a wide variety of jobs with almost daily die changes.

125 STROKES PER MINUTE on a 300 TON PRESS with a 6″ STROKE

This is a lot of strokes per minute for a 300-ton automatic press especially on a part requiring a 6″ stroke. This is one of the reasons why The Budd Company, Philadelphia, chose high production Henry & Wright Dieing Machines. They also needed flexibility for a wide range of short-run jobs; accurate die guiding to assure minimum wear on expensive, multi-stage progressive dies averaging 8-stages each; automatic material feeding and parts ejection; quick and easy die changing . . . all so necessary to stay profitable in the highly competitive stamping business.

You'll find Henry & Wright machines will meet every production requirement. The 6″ stroke, high tonnage job described in the headline is a severe test for any heavy automatic press. If you need more production, at competitive costs, for a variety of jobs, ask now about the high production Henry & Wright machines. Your inquiry will receive our prompt attention. Sizes from 25 to 500-ton capacity.

MMT PE — MODERN MACHINE TOOLS — PRODUCTION EFFICIENCY

THE HYDRAULIC PRESS MANUFACTURING COMPANY
A Division of Koehring Company • Mount Gilead, Ohio, U.S.A.

HPM

H41

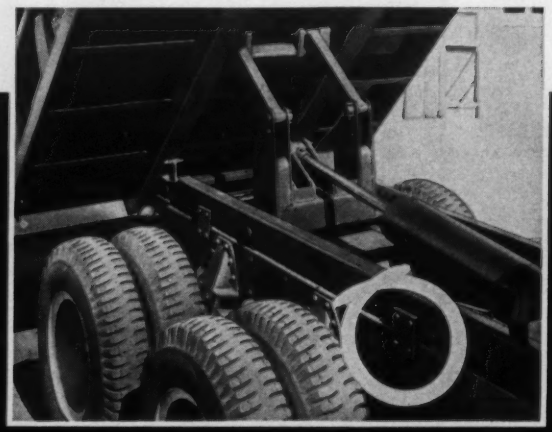
NYLOK NUTS GRAB HOLD... LOCK TIGHT

Vibration and heavy loads can't shake them loose

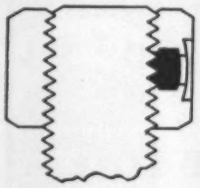
Put tons of load in a dump body, hoist it up, slam it down. Drive the truck over rough, jarring terrain. Still Republic NYLOK® Nuts hold tight—grip with a positive lock to anchor Heil Dump Bodies to the chassis as one solid unit.

NYLOK Nuts stay tight in any position—seated or not. They're easy to apply manually or automatically. Can be used over and over.

Check your products for applications where NYLOK Nuts can do the job better, save you money. Then contact your Republic Distributor. Mail coupon for more data.

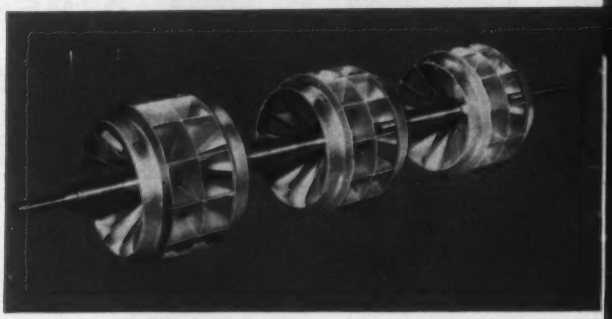


Dump body by Heil Company, Milwaukee, Wisconsin. Unit is anchored to the chassis by 16 Republic NYLOK Nuts.

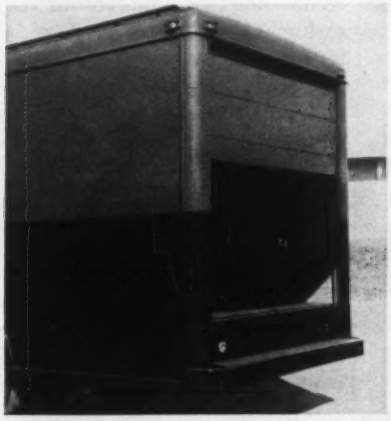


HERE'S HOW NYLOK WORKS

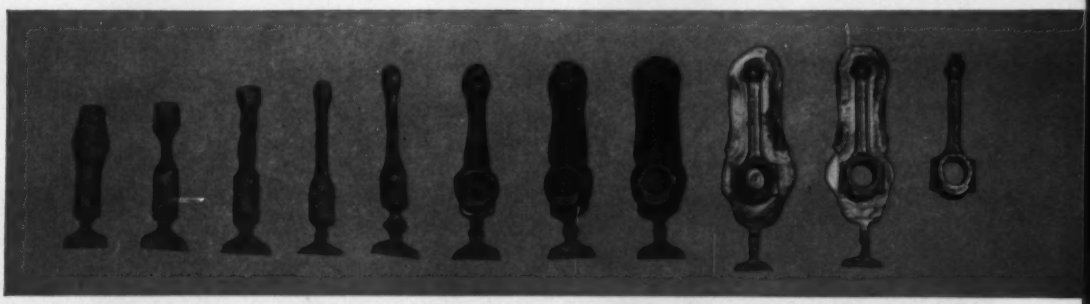
A nylon plug firmly staked into one of the faces of the cold forged hex nut forces a tight, metal to metal contact of opposite mating threads for vibration-proof lock.



ROTOR SHAFT MACHINING ELIMINATED. Buffalo Forge Company, Buffalo, N.Y., uses *Republic* ELECTRUNITE® *Mechanical Tubing* as rotor shafting in air-conditioning and ventilating unit blowers. ELECTRUNITE's uniform concentricity eliminates need for shaft machining—saves time and money. Shafts are bored at each end and plug inserted for the bearing. Send coupon for more facts on ELECTRUNITE Tubing, stainless, or carbon.



PAINT STAYS ON. Selection of steel for overhead doors on U.S. Post Office trucks involved two important factors: steel must meet rigid government paint adherence specifications, yet must be economically priced since the manufacturing contracts are on a competitive bid basis. Gerstenslager Co., Wooster, Ohio, chooses *Republic Electro Paintlok®* to meet these requirements. Send coupon for more Electro Paintlok information.



SPEED CONNECTING ROD PRODUCTION. Forging connecting rods from *Republic AISI 8637 Hot Rolled Alloy Steel*, Bingham-Herbrand Corporation, Fremont, Ohio, realizes substantial savings. Non-varying uniformity permits faster production with fewer rejects. Send for data on uses of high production Republic Alloy Steel for your products.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. IA-9557
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

☐ Hot Rolled Alloy Steel ☐ Electro Paintlok
☐ NYLOK Fasteners
☐ ELECTRUNITE Mechancial Tubing

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

This coil-fed Wean "Flying Press" line performs both shearing and blanking operations.

Massey-Ferguson saves up to $9 per ton on material costs with Wean coil processing lines

As a measure of its products' popularity, Massey-Ferguson, Ltd. of Toronto cites the fact that M-F combine and baler production fills every available Canadian railroad flat car twice a year.

Five years ago, Massey-Ferguson's production and purchasing personnel made a thorough cost study of their extensive steel demands, then being provided by shearing from purchased sheets. As a result, three Wean coil processing lines were installed to supply these requirements directly from standard coil.

The three Wean lines are: (1) an edge-trim and cut-to-length line, with a flying shear; (2) a Wean slitting line; and (3) a Wean "Flying Press" line that offers the versatility of straight or angle shearing or blanking of coil stock, all in one machine.

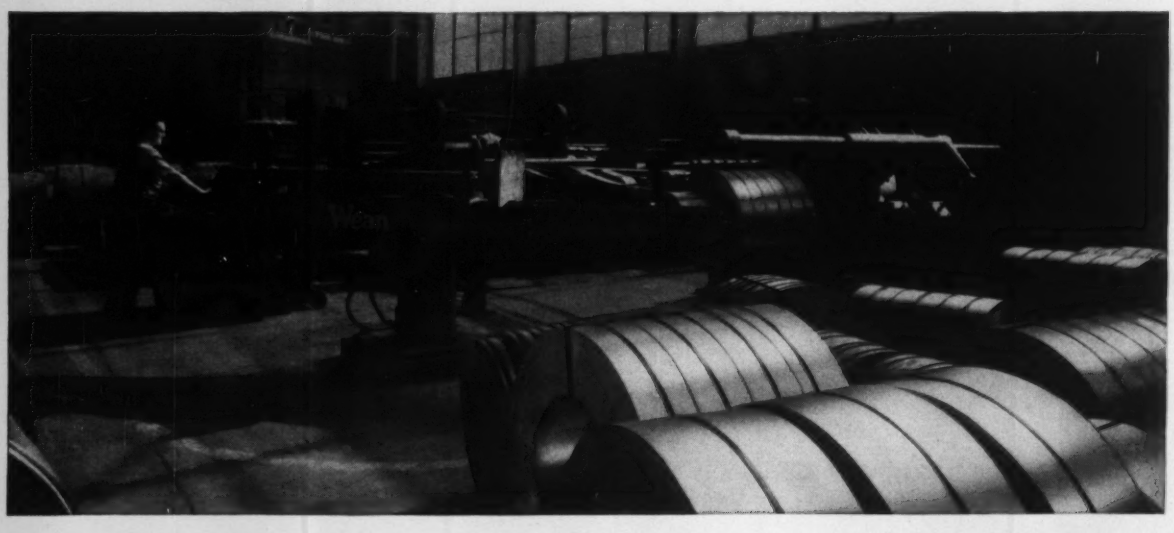
Massey-Ferguson management credits this coil processing system with savings of from $4-9 per ton of metal consumed. And besides the direct production savings in sheet supply, the threat of model-change obsolescence is removed when steel inventory is in coil form.

Many metalworking firms have had similar experience in the profit-making aspects of coil processing equipment. The concept and economics of coil processing are discussed in a new brochure available from Wean. Write for your copy of this informative catalog.

WEAN EQUIPMENT CORPORATION
22800 Lakeland Boulevard
CLEVELAND 17, OHIO

WEAN

Standard coils are slit to a wide variety of widths on this Wean line at the Toronto M-F plant.



QUALITY

begins with

KEYSTONE WIRE

GARDNER WIRE CO. of Chicago manufactures millions of wire springs for such diverse industries as home appliances, controls, automobiles and toys.

For 20 years Gardner has used Keystone MB Spring Wire on such applications as the cord protector spring illustrated above. This particular spring has five different dimensions—each must be held to tolerances of ±.0005". Special cams to make this part are hand ground. Control of dimensions in a spring wire, especially a wire with superior performance characteristics like Keystone's MB, builds a better end product and allows faster runs at lower cost. Production interruptions are virtually eliminated. Keystone product uniformity also assures spring makers that their product will perform exactly as calculated over a long life. Keystone MB is shipped clean—takes plating reliably.

Your Keystone representative is a wire specialist. Consult him for the correct wire to improve your product and your reputation for quality.

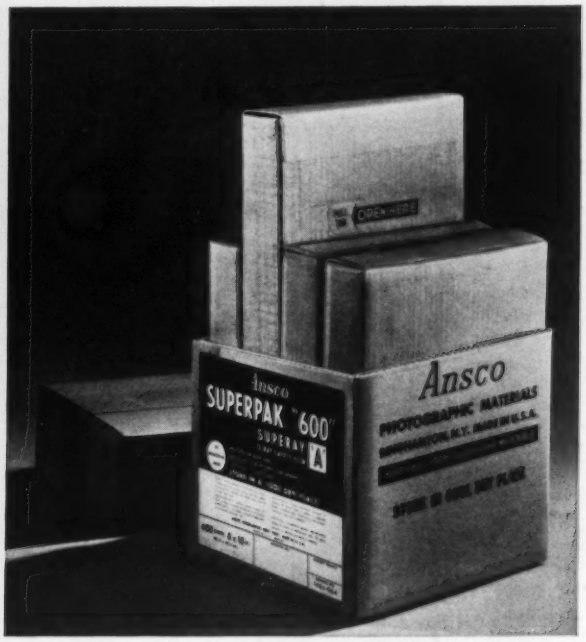
Hundreds of spring sizes and shapes are produced at Gardner from Keystone MB Spring Wire.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE

WIRE FOR INDUSTRY

NEW! ANSCO SUPERPAK



for the first time, a new x-ray film packaging that saves time and lowers costs at no sacrifice in quality.

Interrupting operations to open small quantities of X-ray film? Handling many small packages and wrappings? Never again with Ansco SUPERPAK. New Ansco SUPERPAK® is the modern way to increase your efficiency through 600 non-interleaved sheet or 300 interleaved sheet packages of Superay 'A' or Superay 'B'.

Whenever the storage bins (SUPERPAK fits standard film storage bins) need refilling, pause for a moment to open SUPERPAK, work on until the job is completed without further interruptions. Just think of the savings in man-hours and money through this new, sensible method of packaging.

Ansco
Superpak

From every point of view; money, time and general efficiency . . . it makes sense to use SUPERPAK. Ansco, Binghamton, N. Y., A Division of General Aniline and Film Corporation, Manufacturer of World Famous Superay X-ray Films.

General Electric's outstanding service organization helps keep your furnaces on the line, producing at a profit.

HEAT
from General Electric

How General Electric service after start-up saves you heat processing dollars

High temperatures and high stresses used in heat processing can cause fatigue and wear in furnace parts. When need for replacement of these parts stops production, you can't take chances. You need fast, efficient service to get the lines moving again, with minimum downtime.

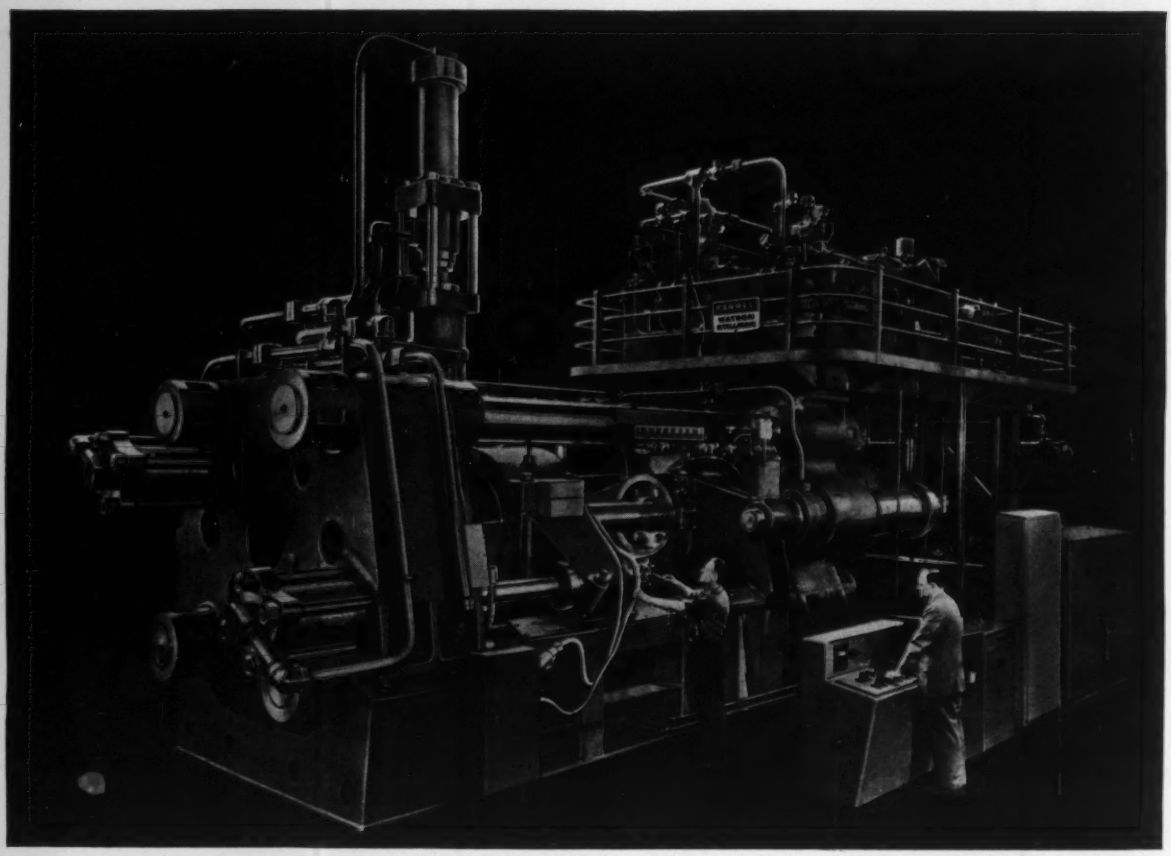
General Electric is always ready to provide just this kind of service after start-up. Your G-E heating specialist, district field engineers, nearby service shops, and a fast-moving renewal parts organization are all quickly available to help when you have a planned repair program or emergency breakdown.

Example: General Electric helped plan the rebuilding of high-temperature copper brazing equipment for an Ohio customer. G.E. provided new brickwork, heating elements, hearth material, and supervised installation. This planned maintenance helped complete the job with minimum interruption to production.

Example: Rolls of a sintering furnace failed due to over-temperature operation. General Electric installed all new rolls in less than three weeks.

Make sure the furnaces you buy or specify are backed up by service that keeps your heat treating line at its profitable best. Contact your nearby General Electric Apparatus Sales Office for "added value" on your next furnace installation. 721-35

GENERAL ELECTRIC



Press being tested under dry run conditions prior to shipment.

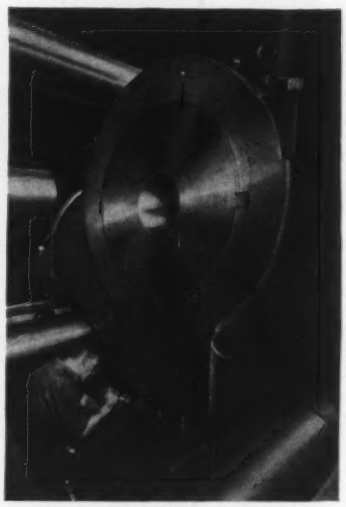
3300-ton press extrudes solid or hollow billets at high speeds

This huge Farrel Watson-Stillman press extrudes 12″ diameter x 32″ solid or hollow billets at ram speeds of 47″ and 57″ per minute respectively.

The container housing system has a separate holding pump—assuring positive container sealing at all times. Container cylinders have a 20-inch stroke, which allows ample room for dressing dies in the press, reducing non-productive downtime. The press is equipped with a fully automatic bridge cycle.

For all its 3300-ton capacity (it can be operated at 3500-tons for breakthrough on tough alloys), the press is easy to operate and maintain. The double die-slide feature simplifies die changing: A complete tooling stack can be placed in the slide while the press is running. New two-piece container housing facilitates container removal.

Write for description and specifications of a press to meet your requirements. Capacities range from 60 to 6,000 tons in standard and special designs.



Workman makes final adjustment on the container housing.

FARREL-BIRMINGHAM COMPANY, INC.
WATSON-STILLMAN PRESS DIVISION

571 Blossom Road, Rochester 10, N. Y. • *Telephone:* BUtler 8-4600

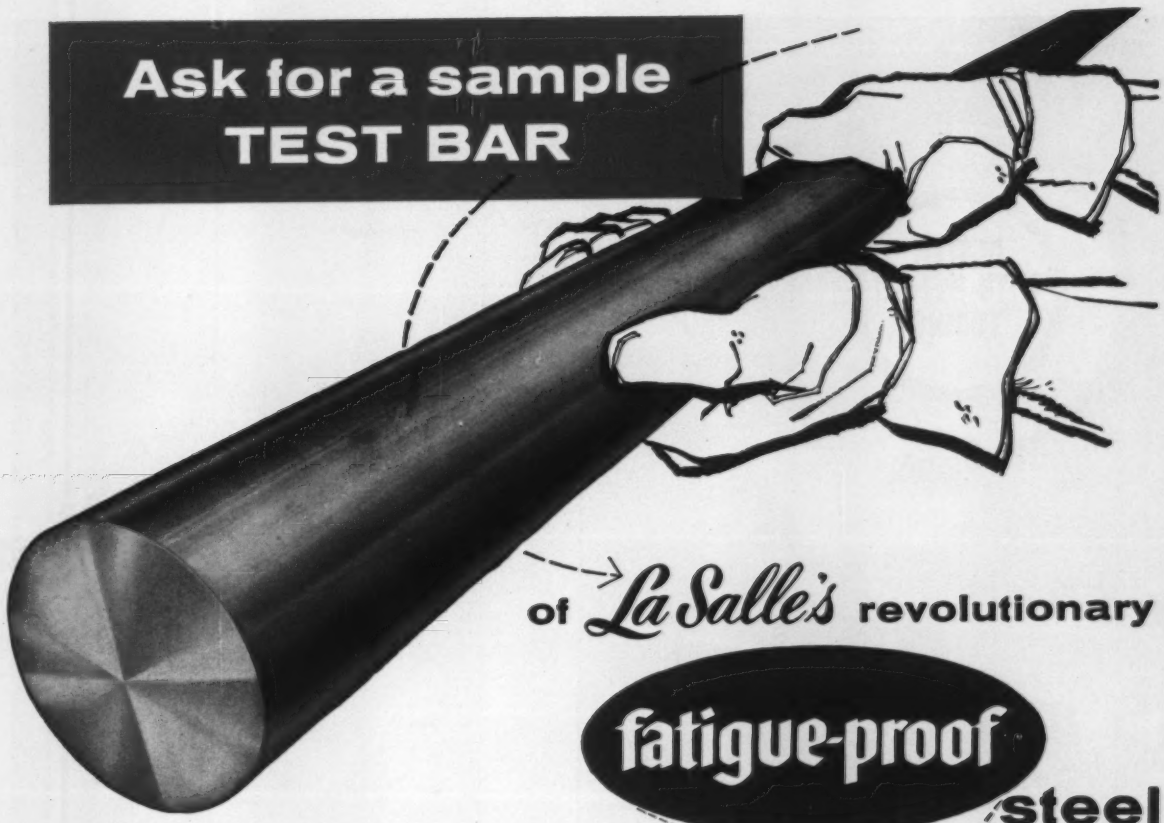
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

Manufactured in Canada by: Canadian Vickers Limited

FARREL WATSON STILLMAN ®

WS-72

Ask for a sample TEST BAR



of La Salle's revolutionary

fatigue-proof steel

MADE BY THE e.t.d. PROCESS

Elevated Temperature Drawing

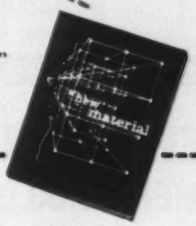
The steel bar that has high strength WITHOUT HEAT TREATING

Yes, La Salle invites you to test a sample bar of the remarkable new FATIGUE-PROOF. This amazing new material is its own best recommendation . . . as proven by the many original equipment manufacturers who have already tested (and are using) FATIGUE-PROOF.

If you are making parts requiring strengths in the tensile range of 140,000 to 150,000 psi, and want to eliminate the expense or problems of heat treating . . . if you want to save production costs with a bar that machines faster (25% faster than annealed alloys—50% to 100% faster than heat treated alloys) and gives you a beautiful finish, too . . . if you want to improve the quality of your product while saving money, send us a blueprint, drop us a note giving application details, or better yet . . . pick up your telephone and call a La Salle sales engineer (REgent 4-7800, Chicago, Illinois).

FREE

Get your copy of "a new material," a 24-page booklet which gives detailed information on La Salle "FATIGUE-PROOF"® steel bars.



La Salle STEEL CO.

1436 150th STREET • HAMMOND, INDIANA

Manufacturers of America's Most Complete Line of Quality Cold-Finished Steel Bars

Please send me your "FATIGUE-PROOF" Bulletin.

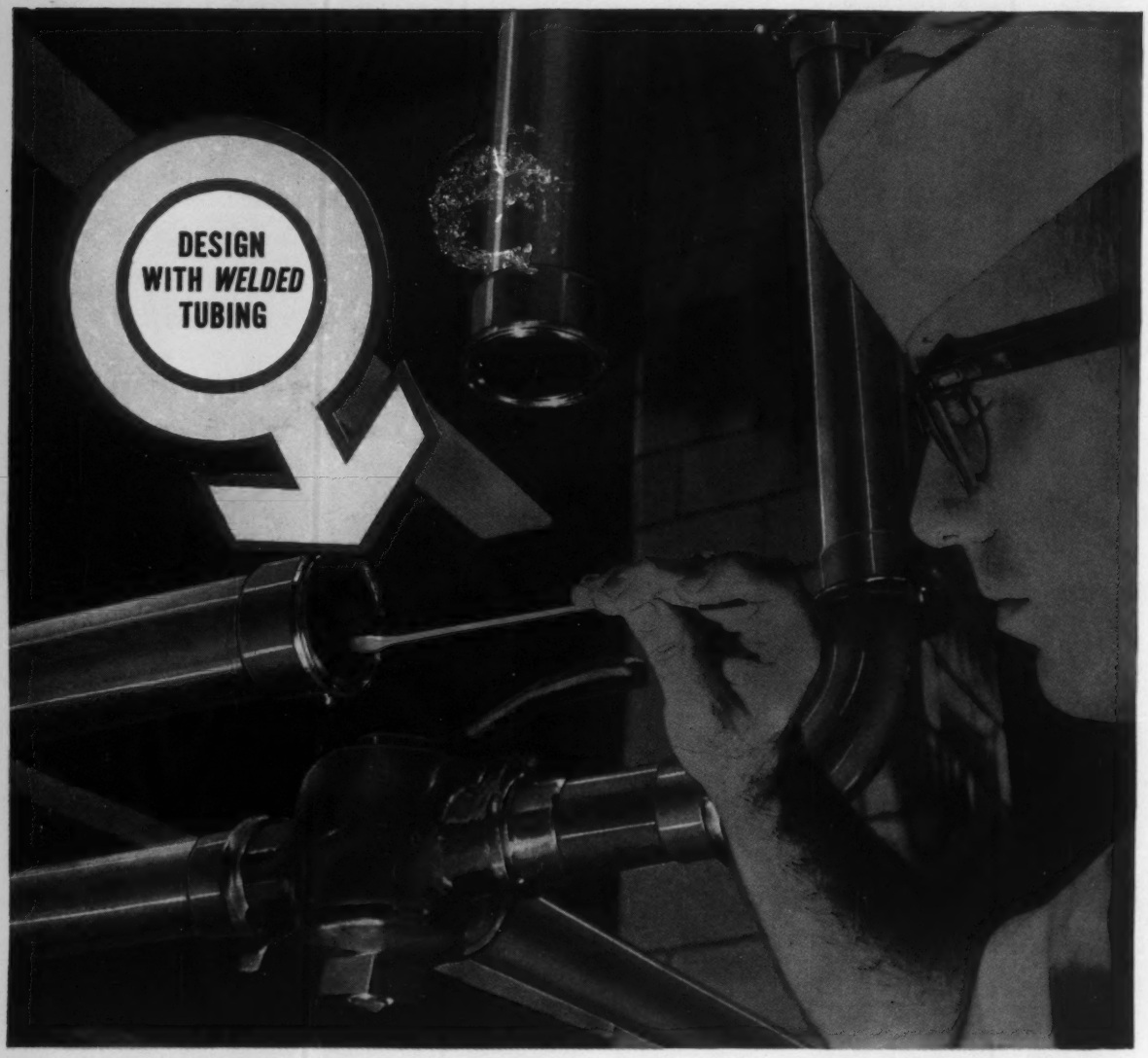
Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____



WELDED STAINLESS TUBING AND PIPE in antibiotics production

DIMENSIONALLY UNIFORM for precision fabrication

SOUND, SMOOTH SURFACES—easy to clean!

Welded tubing of tough stainless steel is a designer's dream for pharmaceutical applications. Here is where elaborate networks for transfer piping call for all of welded tubing's advantages . . . *predetermined* uniformity of wall thickness . . . consistent roundness . . . smooth, readily cleaned surfaces, inside and out.

These inherent qualities confer ease and speed in complex fabrication. Welded steel tubing is adaptable to all types of fittings. Every type of joint can be produced. Forming is precise because welded tubing is dependably accurate in dimension in every size, length after length.

Complete design data is available to you from FSTI headquarters. Ask for comprehensive Bulletin 8591 . . . and for assured application satisfaction, specify welded tubing from a quality tube producer.

FORMED STEEL TUBE INSTITUTE, INC.

1604 Hanna Building, Cleveland 15, Ohio

• Armco Steel Corp. • The Babcock & Wilcox Co., Tubular Products Div. • The Carpenter Steel Co., Alloy Tube Div. • Clayton Mark & Co. • Damascus Tube Co. • Jones & Laughlin Steel Corp., Electricweld Tube Div. • National Tube Div., United States Steel Corp. • Ohio Seamless Tube Div. of Copperweld Steel Co. • Republic Steel Corp., Steel and Tubes Div. • Revere Copper and Brass Inc., Rome Manufacturing Company Div. • Sawhill Tubular Products, Inc. • Southeastern Metals Co. • The Standard Tube Co. • Superior Tube Co. • Trent Tube Co., Subs. Crucible Steel Co. of America • Union Steel Corp. • Van Huffel Tube Corp. • Wall Tube & Metal Products Co.

LC-602

STEEL USERS WILL BE LIQUIDATING INVENTORIES at the rate of 1 million tons a month by the end of June if the present order trend continues. Although steel stocks are at a relatively low level, liquidation has already started. The order picture indicates an increasing rate of stock slashes through June and July.

PRODUCTS OF CHEMISTRY TO COMPRISE ONE-THIRD OF BUILDING MATERIALS in the 70's, says H. D. Stewart, president of Allied Chemical's Barrett Div. In near-future chemical product uses, Mr. Stewart picks polyethylene cold water piping, nylon hot water piping, and plastic sewer pipes, gutters and flashings.

BUYING OF STEEL AND NONFERROUS metal products for all the armed services will be handled by a single agency beginning next year. The move, part of Defense Dept's. new single manager procurement plan, is aimed at simplifying buying. (P. 109)

FORWARD PURCHASE COMMITMENTS WERE LONGER in April compared to March, but shorter than at start of year, reports the National Association of Purchasing Agents. Commitment trends are mixed by areas, some up, some down. Commitments cover capital expenditures, production materials, and maintenance and operating supplies.

JAPANESE CONTINUE PENETRATION OF FAR EASTERN MARKETS. One Eastern hemisphere steel producer recently ordered 50,000 tons of hot-rolled strip from Japan to augment its output. It is believed this is only the first of several orders through 1960.

HUGE GROWTH IS AHEAD FOR ELECTRONIC AUTOMATION business. C. C. Lasher, a top GE computer division executive predicts "a total industry volume of more than $20 billion by 1970." This figure is up more than 300 pct over last year's estimated industry volume of some $6 billion.

SALES OF U. S. GOODS ABROAD INCREASED considerably in the first quarter. Nonmilitary shipments, totaling $18.4 billion at a seasonally-adjusted annual rate, compare with $15.4 billion a year ago. Sharing in the gain: Machinery--in the aggregate, up 12 pct.

FOUNDRY EQUIPMENT ORDERS JUMPED in March to 159.9 (1947-49—100) from 128.6 for February in index of Foundry Equipment Manufacturers Association. Index is for new equipment.

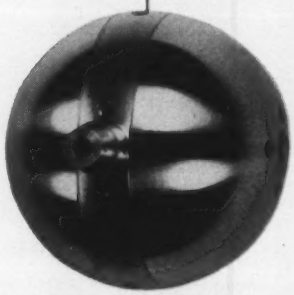
PRECISION:

Beryllium specialists, Leemath Incorporated of Long Island, create delicate and precise mechanisms in this high strength but toxic and abrasive wonder metal. In their temperature-controlled shop, this feather-light gyro float assembly (shown actual size, right) was turned on a special high-precision LeBlond Dual-Drive Lathe. *Spherocity had to be concentric with the two major axes within .0005" total indicated runout of 1.8750"!* (To hold the assembly that close, component tolerances had to be even tighter!)

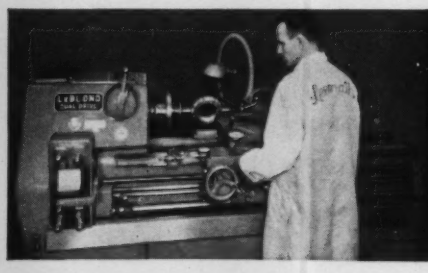
To perform such touchy work, Leemath ordered their LeBlond 15" Dual-Drive to ultra-high precision standards. For this lathe Timken furnished specially-made bearings with one-third the runout of their finest precision class. With it came the standard features that give LeBlond its reputation for long-lived precision —combination gear-belt drive headstock with 16 speeds, 31 to 2400 rpm; compensating vee bed way construction with hardened steel shears; thrust-lock tailstock; and many more.

People buy lathes for many reasons. But when, like Leemath, they must have precision they can depend upon, that is reason enough to buy LeBlond.

If you would like to have the full story of LeBlond's Dual-Drive, ask your distributor or write for Bulletin 6A.



Reason enough to buy LeBlond



THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LEBLOND *of Cincinnati*

Military Revamps Metals Buying

As Single Manager, Navy Will Handle Purchasing

Starting next year, the major portion of metals buying for all the services will be directed by a single agency.

Move is part of Defense Dept. plan to improve military buying. —By P. J. Cathey.

■ Steel and nonferrous metals buying for all the armed services will be handled by one agency beginning next year.

Right now each of the four services purchases and distributes its own metals. But, starting in 1961, the vast majority of metals purchasing for the Navy, the Army, the Air Force, and the Marine Corps will be directed by MISA (the Military Industrial Supply Agency).

MISA was set up late in 1959 as an extension of the Defense Dept. "single manager plan" to reorganize and improve military supply operations. Its establishment was based on recommendations made by the Armed Forces Support Study Team and the services themselves.

Navy Is Manager—In the case of metals, the Navy, acting as single manager, will perform wholesale supply functions for all the services. Through MISA, located at 700 Robbins Ave., Philadelphia, it will handle buying, cataloguing, standardizing, storing, distribution, and disposal of excess metal products.

Here's how it will work: A series of metal distribution points will be established throughout the country (see map). Although the map shows the distribution setup for paints, MISA officials say many of the same points will be used for metals (red stars). Military needs for steel will be met by shipments from these points.

Other locations (black stars) are Naval shipyards, the Naval Supply Depot at Newport, R. I., and the Naval Weapons Plant at Washington, D. C. These direct support points will be fed metals directly from industry. They will handle only the needs of these installations, but make no shipments elsewhere.

Plan Objectives — The freight rate break limits are points equally distant from two or more distribution points. Point mid-way between Albany, Ga., and Mobile, Ala., distribution centers, for example, can

How a MISA Distribution Plan Works

Single Manager Distribution System For Paint Products
With Freight Rate Break Limits
Legend
★ Distribution Points
Support Area Limits
Freight Rate Break Limits
Naval Shipyards–Major Metal Consumers Will Be Supported Directly From Industry

be supplied at the same cost from either point. Beyond that, there is a definite freight advantage in using the nearest distribution center.

Prime objectives of the single manager plan are:

Greater buying efficiency.

Elimination of costly, time-consuming cross-hauling of supplies.

Economy of supply.

An end to duplicated effort and overlapping between the services.

As an example, take the change made in supplying paint products under MISA. The major sources of military paint buying are in the New York-New Jersey areas.

How It Works—The Army's closest stocking point was Schenectady, N. Y. Paint might move from Union, N. J., to Schenectady for stocking. Then it might be requisitioned by a base in Europe. In this case, the paint would be re-shipped to the New York area for transport overseas.

Under the MISA paint setup, scheduled to go into operation this October, the paint is purchased, stocked at Bayonne, N. J., and available for quick shipment. In organizing Federal Supply Group 80 (paints, brushes, sealers, and adhesives), MISA reduced the number of stock points from 36 to only 8. It has cut the number of items managed from over 4400 to about 3500.

When Federal Supply Group 95 (metal bars, sheets and shapes) goes under MISA, the agency expects to handle about 10,000 items. At present, Defense Dept. classifications include about 21,000 items.

Big Customer—Some of these, however, will be kept by the services involved. MISA will not handle, for example, metals bought for research and development work. Nor will it handle metals required in the operation or service of a specific, single weapon or system. Items bought locally in small quantities by military installations will also be excluded. With these exceptions, the balance of metals purchased will be controlled by MISA.

And the size of the MISA metals package will be large. Metals sales to the armed services in 1959 totaled $31.4 million. The bulk of this buying was handled through five major agencies: The Navy's GSSO (General Stores Supply Office, Philadelphia), $21.55 million; The Air Force's MOAMA (Mobile Air Material Area, Mobile, Ala.), $5.25 million; the Aviation Supply Office, Philadelphia, $1.43 million; the Army's Raritan Arsenal, Metuchen, N. J., $1.64 million; and the Army's Engineer Supply Control Office, St. Louis, Mo., $1.45 million; others, $108,980.

Total ferrous and nonferrous metals bought by the Navy's GSSO from domestic sources in the first half of 1959 was over 3 million tons.

Eliminate Duplication — Reducing supply points and consolidating buying doesn't automatically cut the number of items carried. Many metal items now stocked by the services must be supplied for only one military service (see table). The greatest number of metal items, 18,296, belong in this category. Over 1100 items are used by two owners, only 173 by three owners, and 33 by four.

But already MISA has discovered that this total group, 19,640, includes all of the 21,726 items listed by the Dept. of Defense. The shrinkage comes from duplicate

Common Use of Metals By Armed Forces

Products	Used By 1 Service	Used By 2 Services	Used By 3 Services	Used By 4 Services	Total Items
Iron and Steel					
Non-electric wire	622	95	25	2	744
Bars and rods	4612	251	76	1	4940
Plate, sheet, and strip	1916	70	5	0	1991
Structural shapes	446	24	9	4	483
Nonferrous					
Wire, non-electric	335	30	2	2	369
Bars and rods, nonferrous	2115	102	13	1	2231
Plate, sheet, strip & foil	1664	134	20	4	1822
Structural shapes	6566	421	22	19	7028
Precious Metals					
Plate, sheet strip, foil and wire	20	11	1	0	32
Total	18,296	1138	173	33	19,640

Source: Military Industrial Supply Agency

items bearing the same stock number but now managed by different branches of the services.

When MISA is the single manager for metal buying, additional duplication should be discovered.

Bigger Job Ahead — "Under MISA," says Captain John W. Bottoms, executive director of the agency, "we will be able to standardize materials, simplify and reduce the number of items carried, and redistribute and dispose of excess stocks. Buying will be more efficient because MISA will generate orders based strictly on inventory needs and programs of users."

In addition to metals, and paints, MISA will handle buying in Federal Stock Group 53, Hardware and Abrasives. This group, scheduled to go under MISA control by mid-1961, will present the greatest challenge so far.

There are almost 600,000 hardware items now catalogued by the Defense Dept. MISA officials estimate the final package to be managed will include about 200,000 items.

Army-Navy—The MISA operation represents a solid example of armed forces integration. In addition to Navy personnel, the staff at Philadelphia includes representatives from the Army and Air Force.

Under the single manager idea the Army will provide all the services with general military supplies (MGSA) including housekeeping items, hand tools, clothing and textiles.

Chain of Command—The Secretary of the Navy gave responsibility for military industrial supplies to the General Stores Supply Office, Philadelphia.

Captain Bottoms, in addition to serving as commanding officer of GSSO, was named executive director of MISA, which is located at GSSO. Commander W. R. Dowd is serving as special assistant to the commanding officer. Captain R. L. Watson is executive officer for GSSO.

Labor Battleground: Right To Manage

Procedures and job rights, not wages, loom as big issues at 1960 bargaining tables.

American Management Association conference highlights attacks and counterattacks.

▪ " 'Matters of procedure' are more important than wages in 1960 labor negotiations. These are simply infringements on management's right to manage." The speaker is George Scott, personnel manager, Chance Vought Aircraft, Inc., Dallas.

Mr. Scott points out, "We've been negotiating since March 11, and we haven't touched on wages since that day." Speaking at the Chicago Labor Relations Conference of American Management Association, Mr. Scott continued, "Containment isn't enough. In 1960 management must seek to push back the frontier, make its own demands, increase its own rights."

Typical Demands—Typical union demands: Right to arbitrate all company job evaluations; right to prohibit combining of jobs; right to okay the content of a job; right to submit demands for arbitration where contracts in other industries provide for such arbitration.

Counterattack—This is the direction of union attack. It spells deeper union control of a company's daily operations. How do you fight it? Here's what top labor relations men suggest:

Educate your foremen and line supervisors, in detail, as to exactly what you mean by 'management rights.' An added wrinkle: Foremen and supervisors then meet with the employees in their own departments, to pass the word, as well as to let them know just how well the company is doing.

Settle dissatisfaction with work conditions quickly, before it develops into a grievance. See that foremen hear about worker problems immediately, get immediate management aid in solving them.

Know Counterparts — See that every management man in your company knows his union counterparts and knows them well.

Watch the grievance clause in your contract. It could be time to counter-attack. One aircraft manufacturer is on an interim contract during negotiations for a new contract. The agreement requires the union pay grievance time costs.

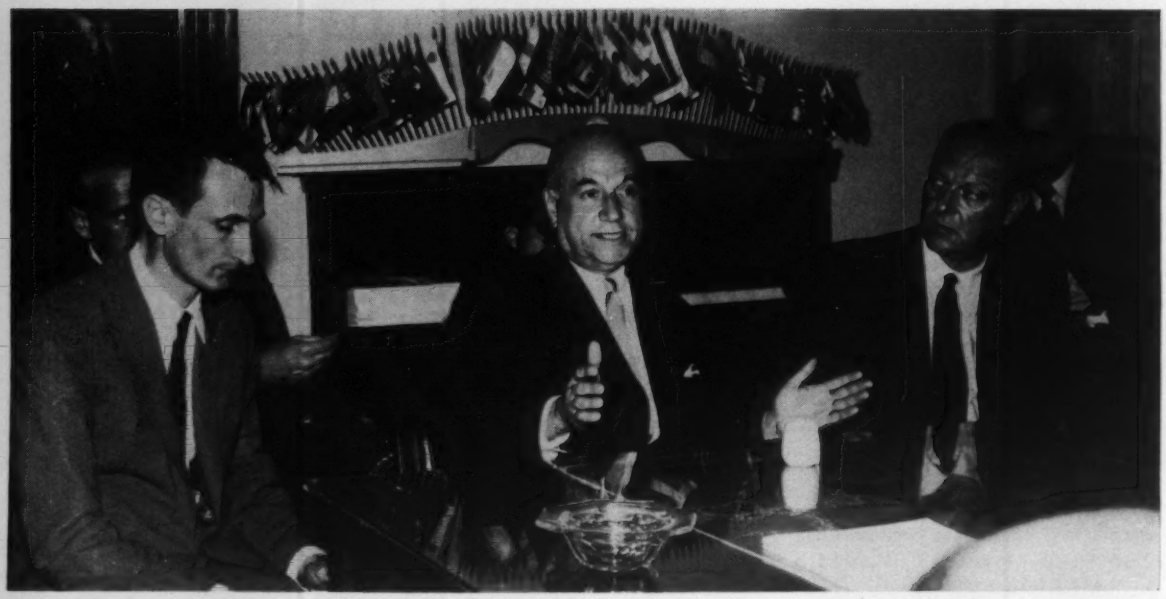
If your union questions one of your job evaluations, and you feel they are right, admit it and quickly.

Health Costs — Mr. H. Becker, Program Planning Director, Blue Cross Association, warns, "Employee health plans cost only 3-4¢ per worker hour 12 years ago. The cost is now 12-13¢ per hour. Employee health plans are becoming appallingly expensive and will become more so. Health is becoming the largest single item in increased labor costs."

Health programs, he warns, should be taken out of the collective bargaining area where possible.

It is still possible to save by spending a little more. Companies that provide regular physical checkups for all employees report their workers spend fewer days per year in the hospital, and total hospital admissions are down.

The Outlook—The 1960 bargaining outlook: You wont be hit as hard on basic wages, but be prepared for trouble in retaining management control of plant operations, and a strong union bid for increased fringe benefits on worker health.



TRADE TREATY: Dr. Paul Prebisch, of ECLA, announces creation of Latin American common market.

Trade Pact for Latin America

Several Latin American nations are voting on a treaty that will establish a common market.

They hope it will help speed economic development of the area.—By F. J. Starin.

■ Legislators of at least three Latin American countries are voting on a treaty that will have a great effect on the development of the area, both as a market and a competitor, in metalworking.

And very shortly at least four more countries will consider the same treaty. It is the pact drawn up under the auspicis of the United Nations, and signed at Montevideo, Uraguay, earlier this year. It forms the Latin American Free Trade Area, a common market.

Member Nations — Argentina, Chile and Uraguay are expected to be the first to accept the document. It goes into effect thirty days after the third ratification arrives at organization headquarters in Montevideo.

Brazil and Peru are considered equally certain to ratify. But they may move more slowly. Mexico and Paraguay are not expected to trail the initial three by very much. Other members are likely after the organization gets going.

The primary aim of the Latin American common market is speedy economic development of the area.

United Nation's Study—An extensive study of the secretariat of the Economic Commission for Latin America shows that the population of the area will grow to nearly 300 million by 1975 from the current 193 million. And it says the population is likely to top 450 million by the turn of the century.

Latin Americans hope to accelerate industrial growth to meet as much of the new demand as possible. This is likely to mean a smaller slice of a much bigger Latin American pie for U. S. and other sellers to Latin America.

Machinery Market — For instance, Latin America must now import over $2 billion of the $2.2 billion worth of machinery it needs each year. By 1975 plans call for the area to be making over $5.4 billion worth of machinery annually. But imports will increase to more than $3.6 billion.

Industrial machinery is the biggest classification in this category. It now is 59 pct of total demand, compared to 13 pct for argicultural machinery and 28 pct for transport.

Imports of machinery and equipment now account for about 32.5 pct of all imports into Latin America. This share of the market will grow to 41.6 pct of 1975.

Steel and Copper—In steel and semi-finished steel products the picture is slightly different. In 1955-56, steel consumption in Latin America was 6.6 million ingot tons, of which 61 pct was imported. Consumption is expected to rise to 37.6 million tons by 1975. However, the area is expected to be able to produce about 32.3 million tons by then, or 86 pct of its needs.

Founders Face Up To Problems

More Emphasis Put on Research and Marketing

Foundry output has not kept pace with the nation's growth, members of the American Foundrymen's Society are told.

Emphasis at the group's annual exposition is on modernization and merchandising.

■ Foundrymen are taking a hard look at their industry and its markets.

The result will probably be a more technically-alert, more sales-conscious industry better able to serve its customers. This emphasis on modernizing and mechanizing were the main themes during last week's 64th American Foundrymen's Society Casting Congress and Exposition at Philadelphia.

"Too Much Security"—Members of the AFS heard some blunt words about their industry from W. J. Grede, chairman of the board, Grede Foundries, Inc. and a former president of the NAM. He first mentioned the many technical advances in foundry practice since the 1920's.

But then he pointed out the industry is hiding its light under a bushel. "We have been too much concerned with security and have possessed too little courage to move ahead into new fields," he said. He called on the industry to: Show the nation what it can do. Talk about the advantages of its products. Improve its training and education programs.

"Our industry must be more and more aware of the engineering nature of its business," he added. "We have spent most of our time making good castings and too little on selling. The castings industry has neglected to broadcast the merits and possibilities of its manufacturing process."

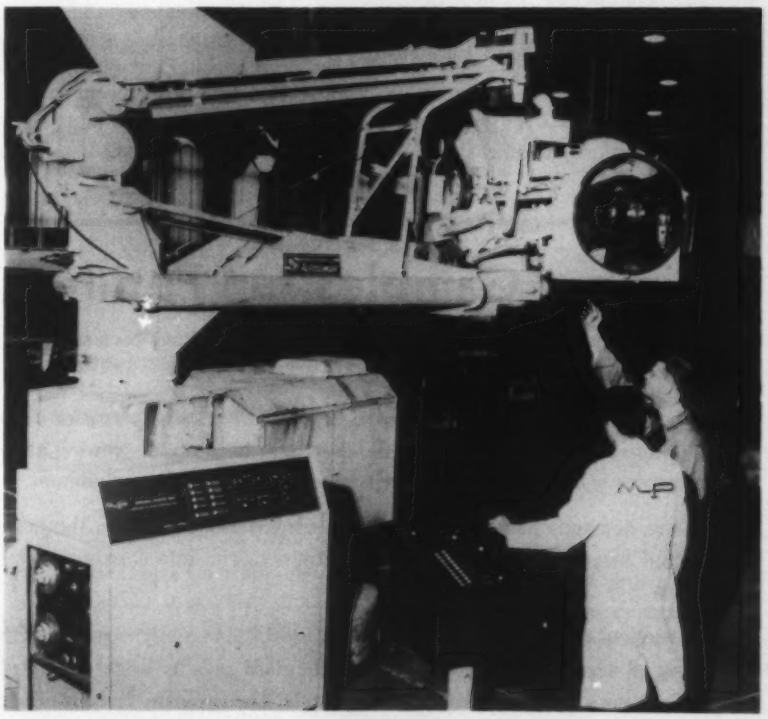
More Research—In addition to sales effort, he urged more attention to technical improvements and research. "We must boldly strike out in new research efforts and have the courage to fail."

The danger signs are up for founders because of these trends, Mr. Grede emphasized: Castings output has not kept pace with population growth or increases in general industrial output.

Comparing the period 1946-47-48 with 1956-57-58 he pointed out the U. S. population increased by 20 pct. In contrast, castings tonnage (adjusted for lighter weight aluminum and magnesium castings) only increased 3 pct.

Other trends in the ten-year period: A gain in the amount of castings work done in captive shops. No significant increase in imports.

Plastic Molds—Throughout the exposition, the emphasis was on modern, better methods of making castings. Booth after booth displayed advances in materials handling, automatic control, metals melting, mold and pattern making, and testing. The growing use of plastic products in making molds and patterns got plenty of attention.



AUTOSLINGER: At the Castings Congress, a magnetic tape control system directed this Autoslinger, a hydraulically operated sandslinger. With the system, operator rams mold in the normal manner and ramming path is tape recorded. Thereafter, tape directs slinger's movements, duplicating original mold. Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, makes the Autoslinger. Controls by Micro-Path, Inc., Los Angeles.

Bright Annealing Catches On

New Lines Brought in for a Growing Market

Pressed by demands of automakers for bright finish with more corrosion resistance, some stainless strip makers are going heavily to bright annealing.

Armco and Wallingford are leaders in offering the product. Early high cost is coming down with new equipment.—By G. J. McManus.

▪ Stainless steel producers are taking a close look at bright annealing as a way to offer a more attractive, more economical product.

Bright annealing is now being used on stainless strip for automotive applications by Armco Steel Corp. and by Wallingford Steel Co., a subsidiary of Allegheny Ludlum Steel Corp.

Studied Closely — Wallingford will triple its bright annealing capacity this August with the completion of a vertical furnace, supplied by General Electric Co. Allegheny Ludlum has ordered a similar unit. Other producers are studying the bright annealing process carefully.

Behind this activity is a push to provide a bright decorative strip that meets the most severe corrosion tests.

Bright annealing works in this direction by protecting strip with hydrogen or other gases during the heating cycle. This prevents formation of oxide scales. The original bright finish is preserved. There is no need for extensive pickling to remove oxides.

Automotive Demands—These are key advantages because auto makers have been pushing for a bright strip finish. The auto people want to hold buffing costs at a minimum. They want to start with as bright a finish as possible.

Stainless mills attempted to meet the demand for extra brightness with conventional means by modifying the pickling action. Pickling tends to dull the surface of stainless; the mills were able to improve strip finish by reducing the amount of pickling. However, this practice led to corrosion complications.

Tests Tightened — The whole problem went critical about a year ago when auto companies began tightening corrosion tests. Strong acids were applied in salt spray tests. The spot test was adopted by General Motors for all incoming shipments of stainless.

As an answer to the tough specifications, Wallingford Steel last December began shipping bright annealed stainless to auto plants. Wallingford has been bright annealing since 1949. The company has two horizontal lines for bright annealing and one pilot model of vertical design.

Moved Quietly—However, Wallingford and others have used the process mostly for chrome nickel specialties. Aircraft, electronic and pen companies have provided a growing demand for this type product. Straight chrome strip for decorative trim has normally been annealed in the conventional manner.

Without any fanfare, Wallingford began applying bright annealing to automotive strip into late last year. By the end of February, the company was convinced it had the answer to automotive demands. In March, Wallingford went to bright annealing for decorative strip as a regular commercial practice.

At that time, the company advised auto people it was prepared to test the most rigid specifications.

Stainless Gambles On Future

For the past year or more, producers of stainless steel have been searching for a way out of a serious dilemma.

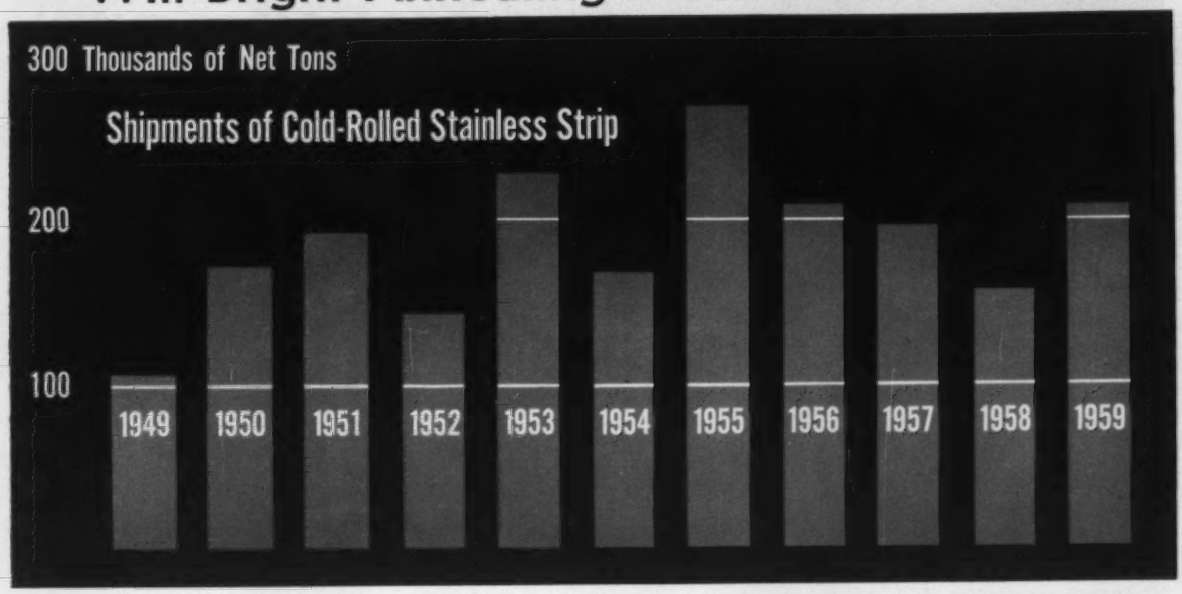
On the one hand, stainless mills have been hit with tough corrosion tests for automotive strip. On the other side, they have been under growing pressure to supply a bright finish that keeps user buffing costs at a minimum.

The two demands have conflicted. With conventional methods, the mills have found they must either sacrifice brightness or run into corrosion complications.

As a way out of this squeeze, Wallingford Steel Co. recently went to bright annealing of decorative stainless strip. Wallingford says its bright annealed product can pass the most severe corrosion tests. The company feels its bright finish will mean important customer savings.

Wallingford is now equipping itself for bright annealing on a volume basis. If production costs work out the way the company expects, the new process could give stainless new assets in key markets.

Will Bright Annealing Mean More Stainless?



Plans for expanded bright annealing capacity moved forward.

Industry Opinions — E. B. Cleborne, Wallingford president, feels wide use of bright annealing was inevitable sooner or later, regardless of customer pressure. Mr. Cleborne feels the process saves customers money, simplifies mill inspection, promotes end-product quality. With strong competition from other materials, he feels the stainless industry cannot afford to ignore any chance to improve its product.

Elsewhere in the industry, opinions vary. Armco Steel has gone to bright annealing for all strip applications that require a bright finish. Armco installed one line for specialty work several years ago. More recently the mill began operating a second unit, capable of handling strip up to 22 in. in width and .050 in. thickness. Armco says it has not had a single rejection of bright annealed samples by auto users.

Cost Factors—Most stainless men concede the quality of bright annealed strip is good. Some have reservations on the matter of cost. No premium is being charged for bright annealing of type 430 strip. There is a question whether sales can be profitable on this basis.

Wallingford feels it will be able to bright anneal without any cost increase over conventional methods. At one time, say company officials, bright annealing cost about four times as much as regular annealing. However, this was when the process was applied strictly to thin-gage specialties.

Coming Down—Improved methods and increased volume have cut those early costs in half, says Wallingford, and another slash is expected when new equipment is installed and operations go on a full tonnage basis.

Some idea of the volume increase can be obtained from capacity comparisons. At present, Wallingford is bright annealing on two horizontal lines. The new General Electric unit will triple capacity. It will move strip at speeds up to 60 ft a minute.

Heavier Gages Coming—A trend toward heavier gages also shows up in equipment specifications. With existing lines, Wallingford can bright anneal stock down to .001 in. The new unit starts with .008 in. as a minimum.

In addition, the company expects important savings from reduced maintenance. Bright annealing has always been done in tube furnaces to avoid contamination by refractories. The new General Electric furnace employs high-purity refractories. Wallingford looks for this feature to bring lower maintenance costs.

New Equipment — Equipment men back the contention that bright annealing can be relatively inexpensive with lines designed for present conditions. Vertical units are now being offered by a number of suppliers.

The Electric Furnace Co., Salem, O., has supplied bright annealing lines with combined capacity of 21,000 lb per hour. The two horizontal units now being used by Wallingford were built by Electric Furnace. The company is now offering a vertical design. It has developed in its laboratory a system of annealing in a vacuum.

Selas Corp. of America has its entry in the bright annealing field. Selas has a vertical design with an alloy muffle. The company reports strong active interest.

While bright annealing research and production expansion is directed largely at the auto market, some additional tonnage demand for the bright stainless is expected to come from the aircraft and electronic industries.

SHIPS OF IRON: Railroads are going after cargos like this pig iron being unloaded at a Great Lakes port.

Trains, Boats Are in Rate War

Railroads serving the Great Lakes are out to take business away from Lake boats.

They've slashed the rates for carrying pig iron from Buffalo and Cleveland to Detroit and Chicago.—By T. M. Rohan.

■ A new Battle of Lake Erie is churning up the waters of the Great Lakes these days. It's a rate war between Great Lakes freight boats and railroads bordering the shores.

The objective is something like $25 million worth of pig iron freight business. Most of the material moves from Buffalo and Cleveland to Detroit and Chicago. For the most part, the boats have had this business to themselves for years.

Plug Was Pulled — The only clear-cut winner so far is the customer who finds shipments faster, treatment more courteous and service generally improved, now that heavy competition has set in. The plug was pulled last year when the railroad rate on pig iron from Cleveland to Chicago was dropped from $11.92 per ton to $6.02.

Although the cut was opposed by the Association of Eastern Railroads, the Nickel Plate and New York Central took independent action to do it. The Great Lakes Ship Owners Assn. and other ship interests protested. However, the Interstate Commerce Commission refused to suspend the new lower rate and it is in for a year.

More Rate Cuts—The Cleveland to Chicago rate cut triggered similar action in Buffalo. In March of this year the Buffalo to Chicago rail rate was dropped from $14.16 per ton to $6.27 after mills told the ICC that private boat costs were $6.21 per ton.

Now Erie, Pa., and Toledo, O., producers have filed for a reduction which is being investigated by the ICC. Cuts for Pittsburgh and Jackson, O., which aren't even on the lakes, are pending and will probably go through.

Boat Rates—A strict cost comparison with the boat rates is difficult. "Bare boat" rates on common carriers are $3.85 per ton from Buffalo to Chicago and $3.60 from Cleveland to Chicago.

To this are added about 10 cents per ton crane costs at each end and $1.68 terminal cost. This last includes loading and unloading and reloading into rail cars. Dumping onto a stockpile costs 88¢ instead of the $1.68.

What's at Stake—At stake is the heavy westbound movement of pig iron across the lakes into the Chicago market. Last year's tonnage figures have not been issued but should run roughly similar to 1958.

In 1958, however, 700,000 tons of pig moved through the Detroit river. This covers traffic into Detroit, Chicago, Milwaukee and Duluth. At a bare boat cost of $3.60 a ton, this is $25.2 million.

With the new rate reduction, pig iron can be moved by rail through the whole year.

Screw Machines Not Always Money Makers

Make-or-buy study made by National Screw Machine Products Association advises caution in making.

Personnel, finance, and department costs must all be investigated and weighted.

■ The National Screw Machine Products Association quotes the vice president of one of the nation's largest corporations:

"Two things, punch press shops and screw machine shops, are sort of traditionally the things that are nice to have around."

According to the association, screw machine shops, at least, as a matter of economics may not be so "nice to have around."

New Study—In a recently published booklet the NSMPA points out some of the black, white, and gray shades of the economics of having your own screw machine department. The booklet was prepared by a committee of the association to "answer the increasing volume of requests made to the association seeking a solution to the make-or-buy problem."

While the association is understandably interested in promoting the sale of machine screw products, its study still strongly emphasizes the need for specific make-or-buy analysis on an individual company basis. A real value of their study is to suggest factors for analysis by individual firms and offer an approach guide to such an analysis.

Three Types — The committee recognizes three categories of captive shop operations:

First, where the screw machine is used in continuous process manufacturing and is part of an automated line.

In this category the captive shop, according to the committee, has the best chance of returning dividends worthy of the investment.

The second category is where the department is operated like a job shop with short to medium runs and many setups, with no other automation economically feasible.

In this category, says the association, the captive shop is, "almost always a certain loser."

The third category is where the quantities are tremendous, the runs extremely repetitive, the setups few, engineering changes minor, and the components made are used in a product that has no anticipated change.

In this final group, "the decision between make or buy becomes more difficult." Scores of factors, says the association, must be investigated and weighted before the better economics can be determined. These factors include labor, investment, hidden costs, engineering, finance, controls, and inventories.

Manhours Needed — According to the findings it takes an average range of 1.69 to 1.76 total manhours to produce only one screw machine hour, and not ⅓ of a manhour as might be thought based on one man running three automatic screw machines.

In capital investment and finance factors the association uses 1959 published figures to show how relatively low is the profit (as percent of invested capital) of screw machine products companies (6.0 pct) compared to machinery manufacturers, transportation equipment manufacturers, and office equipment manufacturers (average: 13.6 pct).

Three Make-Or-Buy Decisions

The make-or-buy decisions on screw machines depends on the special set of circumstances. Here are three typical situations, and the recommendation:

Situation I—Here, the screw machine is used in continuous process manufacturing, part of an automated line.

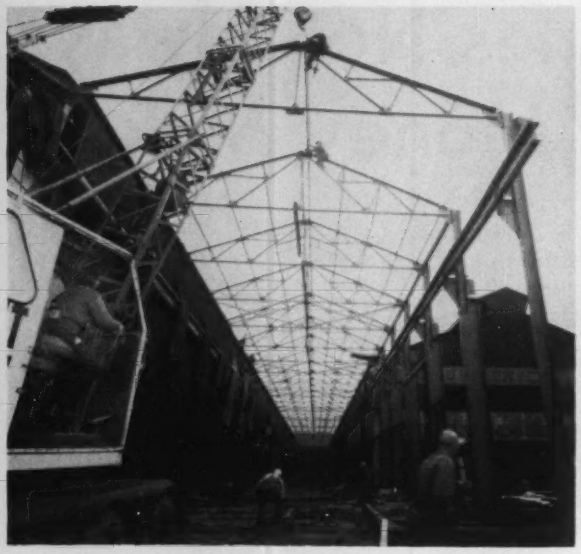
The Recommendation—Under these circumstances, the captive shop has the best chance of returning dividends.

Situation II—The department is operated like a job shop, with short and medium runs, many setups, no automation.

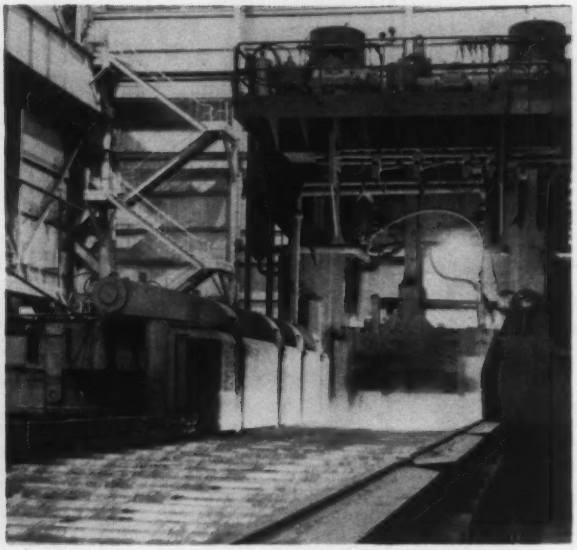
The Recommendation—This shop is almost always a loser. And it makes no difference whether large or small.

Situation III—Quantities are large, runs repetitive, setups few, engineering changes minor, components used in a product that is not likely to be changed.

The Recommendation—No rule of thumb. All factors must be considered. These include labor, investment, hidden costs, engineering, finance controls, and inventories.



STAINLESS: Construction moves ahead on new stainless production and storage facilities at Stainless and Strip Div., Jones & Laughlin Steel Corp., Detroit.



STRUCTURALS: White-hot ingot moves through new structural mill at U. S. Steel's South Works, Chicago. New mill has capacity of 850,000 tons a year.

Buyers Dictate Expansion Plans

Four new steelmaking expansions illustrate the power of the consumer.

Moves at USS, J&L, Inland, and CF&I are all planned to give users fast delivery of products they want, in sizes they want.

■ Steelmakers are rapidly phasing in production facilities geared to customer needs.

Four new projects announced last week point up this trend. They are: Opening of U. S. Steel Corp.'s new structural mill at the South Works, Chicago. A million dollar expansion of stainless inventory and production facilities by Jones & Laughlin Steel Corp. Revamping of a tinning line at Inland Steel Co.'s Indiana Harbor plant to process more tinplate in coils. And ground breaking for an $8 million oxygen steel mill at the Pueblo, Col., plant of Colorado Fuel and Iron Corp.

In Demand—In discussing the new USS structural mill, a company official said, "Chicago is the center of one of the largest market areas for structural steel in the world." Products of the new mill will include lightweight wide flange beams, channels, angles, zees, special shapes, and sheet piling. Its expected capacity is 850,000 tons a year.

Together with planned structural expansion by Inland, total output of structurals from the two companies in the Chicago area could go over 2 million tons a year.

Project 60—Expansion of J&L's stainless bar and wire production and storage facilities is part of the company's new marketing concept for stainless. Labeled Project 60, it's aimed at "recognizing and bolstering the vital role of the steel service center in the stainless industry." Goal of the program: Having all the capacity of J&L's Stainless and Strip Div. devoted to filling needs of service centers.

In support of the plan, J&L is spending $1 million to expand plants at Detroit, Los Angeles, and Louisville, Ohio. Bar and wire capacity at Detroit will be increased by more than 400 tons a month.

More Tinplate Coils—The revamping of tinplate facilities at Inland Steel is also customer-dictated. Expansion of tinplate coiling capacity was influenced by the growing demand for tinplate produced in coils, according to Robert M. Buddington, Inland's sales vice president.

"The nation's largest tin can manufacturers and some smaller can producers are now turning out a high percentage of their products from coiled tin plate," he adds.

The move will enable Inland to process two-thirds of its tinplate output in coils.

Speed at CF&I—Colorado Fuel and Iron Corp.'s new oxygen plant will enable it to make steel in 30 to 60 minutes, say CF&I executives. When project is completed next February, the oxygen furnace will have a capacity of about 70,000 ingot tons a month.

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This is a 36" Bull Block drawing down copper from 5/8" to 1/8" at high speeds.

The Automatic Bull Block can be furnished in all sizes up to 84" diameter. Producing long lengths at high speeds automatically really brings down those costs. For complete information on the Block or any other Cold Draw equipment for tubes, bars, or shapes, write to: Cold Draw, Aetna-Standard Division, Blaw-Knox Company, Pittsburgh 30, Pennsylvania.

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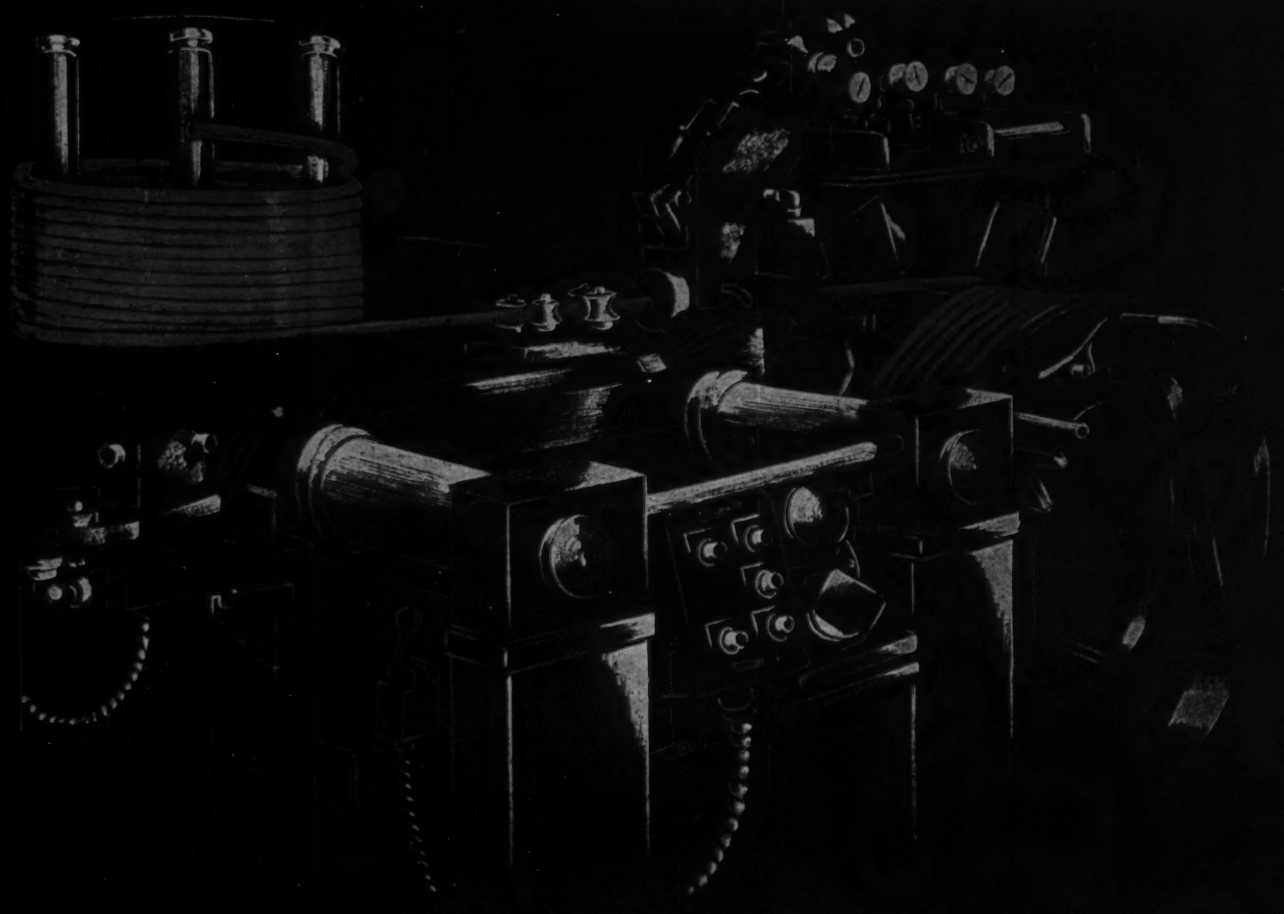


I. G. Pickering

He Made a Career in Copper

I. G. Pickering began his career as a trackman in Kennecott's famous open pit mine.

Today, after years in the industry, he heads the company's new multi-million dollar refinery near Baltimore.

I. G. PICKERING: He tries to follow his father's advice.

■ Ivor G. Pickering started his career in the copper industry in 1934 as a trackman. Today he manages Kennecott Refining Corp.'s new and modern copper refinery near Baltimore.

Mr. Pickering counts 43 years of his life spent in and around the copper industry. He was born in Bingham Canyon, Utah, where his father operated a power shovel for 45 years in Kennecott's famous open pit mine.

The Beginning—It was there that he got his first copper job as a trackman, doing track work on the mine's railroad. The wages helped pay his way through the University of Utah. He was graduated with a BS degree in metallurgical engineering in 1939.

After graduation he returned to Kennecott. He worked in various engineering and operating positions at the mine at Bingham Canyon and in the Iron Foundry and Concentrating Mills, near Magna, Utah.

Experience Helps—Experience in Kennecott's plant engineering department at the mills added to his background in the industry. His increased knowledge led to his appointment as chief design engineer in the company's Western Mining Div.'s engineering department at Salt Lake.

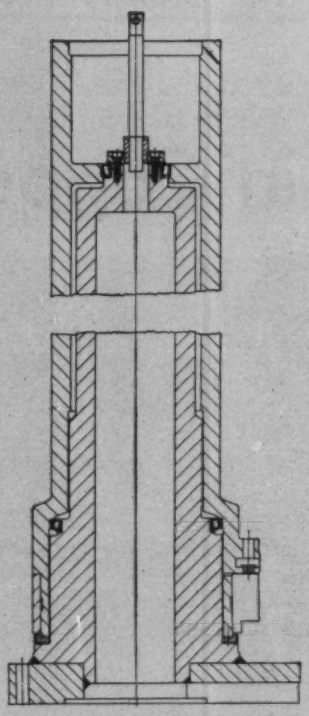
Projects in Kennecott operations at Arizona, Nevada, New Mexico, and Utah led to his assignment as project manager for design and construction of the company's new electrolytic refinery just completed at Anne Arundel County, Md., at the junction of the Patapsco River and the Chesapeake Bay. He was named refinery manager in October, 1959, when preliminary operations at the new facility started.

More Coming—The refinery produces about 10,000 tons of electrolytically refined copper per month. But aggressive Mr. Pickering is confident that production will increase to meet consumer needs.

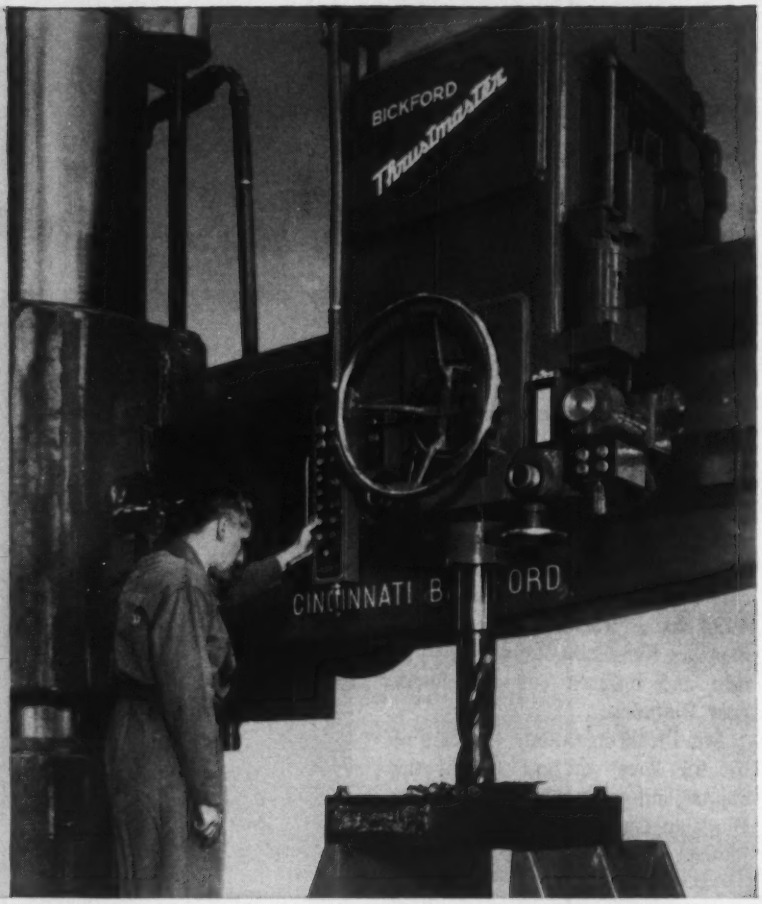
Today, he and his people are busily engaged in smoothing out the production problems with which they were faced in making the highly automated plant function efficiently.

Father's Advice—About his career Mr. Pickering says, "Any success that I have had started when my father gave me a healthy respect for work and effort. He said, 'Don't admit defeat, son, until you have been dead for 24 hours.' I'm trying to follow his advice."

Away from his work, Mr. Pickering says his favorite hobby is reading. He does as much of it as time allows and is a particularly avid reader of technical and management books. For outdoor recreation, he turns to golf and tennis, and enjoys them both.



How **CINCINNATI-BICKFORD** mounts column of "Thrustmaster" radial drill on Timken bearings to assure rigidity.

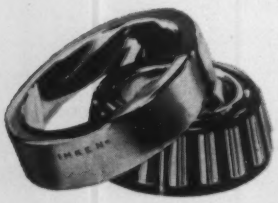


World's most powerful radial drill uses 41 Timken® bearings to assure rigidity, handle extreme loads

WEIGHING 80,000 lbs. and driven by a 50 h.p. electric motor, this 34-inch diameter column "Thrustmaster", by Cincinnati-Bickford Division of Giddings & Lewis Machine Tool Company, is the world's most powerful radial drill. To resist stresses and reduce arm deflection, the column is mounted on large pre-loaded Timken® bearings—one at the top, one at the bottom. They give the column and sleeve the rigidity of a single piece, resulting in greater accuracy and longer tool life, with higher speeds and coarser feeds. And 39 more Timken tapered roller bearings are used in the drill head. Timken bearings assure better performance because they . . .

1) *Take all loads.* Their taper lets Timken bearings take *both* radial and thrust loads. And full-line contact between rollers and races gives extra load-carrying capacity. 2) *Practically eliminate friction.* Timken bearings are geometrically designed and precision-manufactured for true rolling motion.

And Timken bearing service from graduate engineer salesmen qualified to work with your purchasing, engineering and production people is an *extra* advantage. It's service, backed by research and testing facilities unique in the bearing industry. ***That's why Timken bearings give you:*** *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-known name in bearings. 4) The pace setter in lower bearing costs.* Specify Timken bearings for the machines you use or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.* Canadian Division: Canadian Timken, St. Thomas, Ont.



Industry rolls on

TIMKEN®

tapered roller bearings

Think Before Trimming Costs

With the squeeze on profits, you'll be under growing pressure to hold down costs.

But try not to sacrifice long-term earnings for short-term savings.

▪ You'll be under growing pressure in the months ahead to trim costs. It's rapidly developing into that kind of year.

First quarter earning reports highlighted the profit squeeze in many industries. In company after company it was the same story: Strong sales, but less profit per sale.

With the effort to hold down prices, the emphasis can move in only one other direction: Better cost control. This, of course, is desirable.

Think Ahead—But the important point to remember is this: Don't jeopardize long-term profits by short-term cost saving.

This is a fast moving era—both in changing production methods and marketing techniques. There's increasing competition between industries, between countries, between trade blocs. Failure to spend effort — and money — investigating these changes could hurt your company later.

Worthwhile Investments—Money invested in new equipment now may widen tomorrow's markets for your company. Funds spent on research and development today may pay dividends in future new products. Dollars spent on marketing and sales programs may win customers you'll need later on.

But right now, with the pressure on holding down costs, something's got to give. Where, and how much you cut, depends on your company, your market, and your products.

But too many cuts in the wrong places could lead to even leaner profit margins five or ten years from now.

Study Record Keeping — One good area to check might be your company's record keeping. It's true more paper work is now needed to set up adequate management and profit controls.

But sometimes management spends too much time and money trying to handle the unusual and the exceptional.

That's the belief of one authority —Everett B. Drew, eastern regional manager for Photostat Corp. He claims management spends 80 pct of its time and energy trying to handle the out-of-the-ordinary.

"We sometimes get so problem-oriented we forget what the real problem is," says Mr. Drew. "The records department of the average company is asked to devote 80 pct of its facilities and resources, both in personnel and equipment, to documents that have little or no use in the normal course of activities.

"The key to efficient operation of any system is standardization, yet management frequently considers the challenge of the exceptional the all-important test of its ability."

Pattern for Federal Spending

▪ How will Federal spending change in the next ten years? Which industries will gain and which suffer from the changes?

An analysis of the coming pattern is advanced by Walter G. Held, director, government operations and expenditures program, U. S. Chamber of Commerce.

Assuming average economic growth of 3 pct a year, no major national or international emergencies, and no radical change in government fiscal policy, he predicts:

Going Up—The largest increases in federal spending will be for defense, space programs, housing, civil construction including roads, aviation and social welfare.

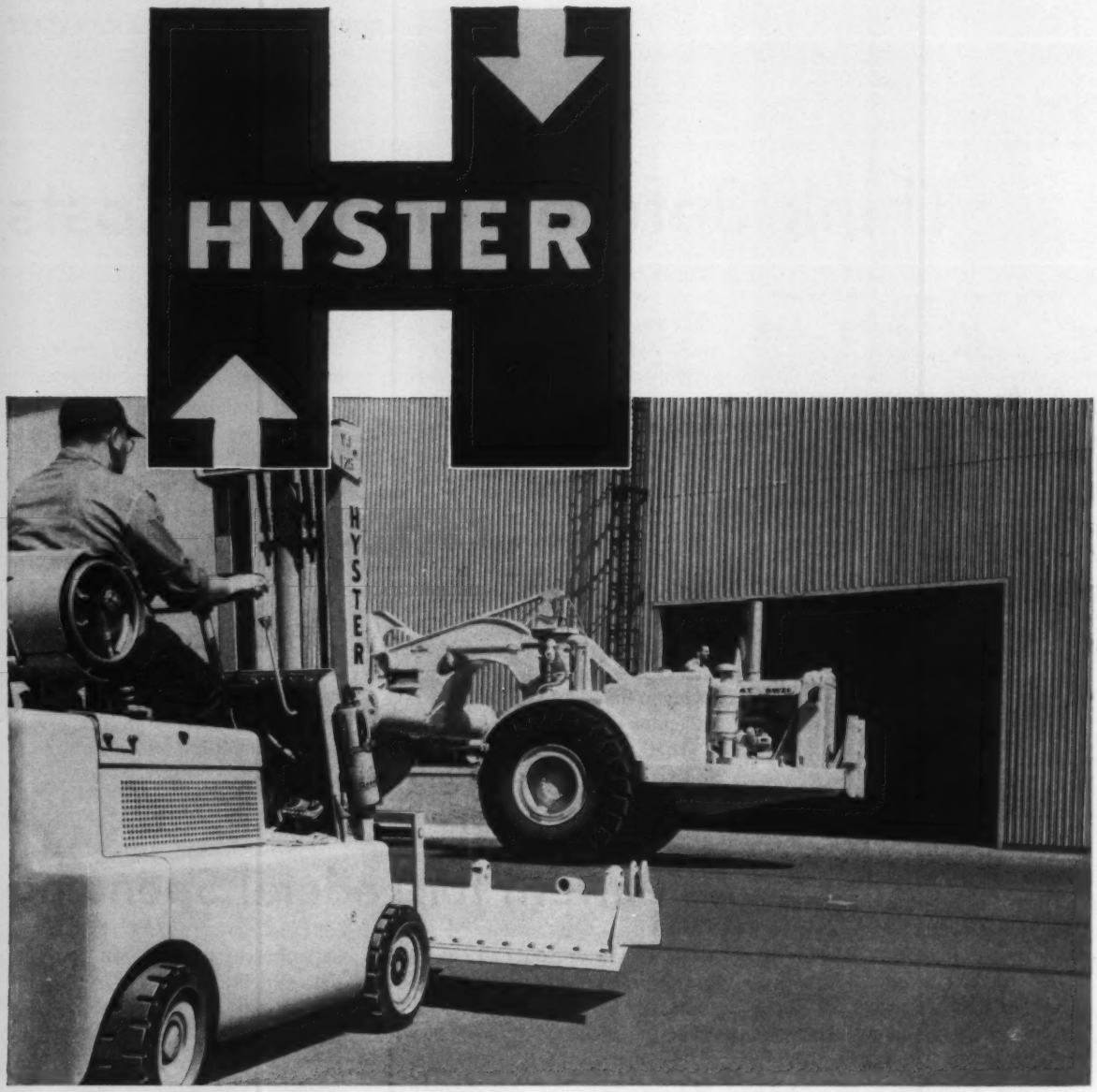
Areas where spending should stabilize or go down are foreign aid, stockpiling, post office operations, agriculture, and interest on the federal debt.

Says Mr. Held: "The probable make-up in the next decade seems to favor those industries in hard goods and research activities." He adds, "Federal spending in the next ten years should not result in an adverse impact on business."

Finally—A GNP Rate Of Half a Trillion

The nation's output of goods and services has finally reached the hoped-for annual rate of half a trillion dollars.

During the first quarter, the president announced, the gross national product was at a record annual rate of $500.2 billion. The first quarter increase (in terms of an annual rate) was $16.7 million.



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A Look at Labor Talks in 1961

Automakers Expected to Form Common Front Again

When contracts expire next year, Big Three automakers are expected to use "parallel bargaining" tactics again.

And the UAW will ask for the profit sharing plan it didn't get in 1958.—By A. E. Fleming.

▪ As in 1958, General Motors Corp., Ford Motor Co. and Chrysler Corp. will form a common front in bargaining for new contracts with the UAW in 1961.

Although each of the Big Three will deal separately with the union, they will offer identical, or at least comparable, proposals. They will carry out for the second straight time the concept of "parallel bargaining" which first took shape in 1958.

This prediction was made at the spring meeting of the Industrial Relations Research Assn. in Detroit by W. H. McPherson. As professor of economics, Institute of Labor and Industrial Relations at the University of Illinois, he interviewed both auto industry and union officials to form his opinions.

No Strike?—Looking at the situation as it now stands, Mr. McPherson believes the odds are stacked against a strike in 1961.

"I think the union will be aware that any strike it might call would be very long and costly in terms of union strike-benefit payments," he said. "I also believe the final offer of the companies will be an acceptable one."

Nevertheless, the UAW is preparing for any emergency. At the first of this year it raised strike insurance dues from its members by 25¢ a month to $1.25. At the end of 1959 the union's strike fund totaled $20.3 million, about $525,000 above a year earlier.

Probable Demands — As usual, union demands will include one for higher wages. In addition, the union is expected to seek improvements in insurance, pension and retirement plans.

However, it looks like the big pitch will be for a profit sharing plan. The UAW's Ford Dept. hinted at this last week in setting plans for early regional meetings in preparation for 1961 negotiations.

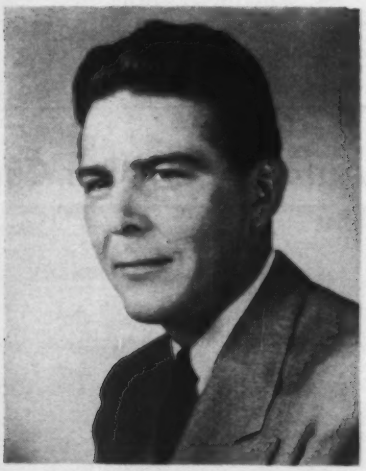
Pointing at Ford's $242.9 million profit in the first quarter of 1960, the union commented, "Ford's enviable profit position throws a heavy responsibility on the company to give overdue consideration to its workers and consumers."

Internal Union Battle? — The union briefly flirted with profit sharing in 1958. But the demand was dumped when the recession gave automakers a bargaining club of their own. However, a battle

Comments on Bargaining

George Romney
President
American Motors Corp.

"Outside of the craft and service industries we must bring collective bargaining back to the facts of the individual competing enterprise. That's where mutual interest of labor, management and capital is at its maximum. That's where it belongs."



M. L. Denise
V. P.-Labor Relations
Ford Motor Co.

"There must be a restoration of balance in collective bargaining by relieving labor unions of monopoly power so they'll meet management on a basis of real power equality. The answer to restoring the balance lies in public opinion, leading to appropriate legislation. . . ."

could develop within the union over whether to go after profit sharing or the short work week.

Ford Local 600, the largest union local in the country, is headed by a very vocal president, Carl Stellato. Mr. Stellato and his local favor fewer hours of work. His proposal was beaten down in 1958 by the forces of International president Walter Reuther. Mr. Reuther wanted profit sharing. The same thing happened in 1955 when Mr. Reuther wanted the "guaranteed annual wage."

Each time Mr. Stellato was told his pet demand would be the main attraction in the next labor bout. It hasn't made the card yet. Chances are slim that it will. But Mr. Stellato can be expected to sharpen his in-fighting and slugging techniques before the UAW settles on its final demands.

Pick and Choose—But the choice of parallel bargaining as a negotiating tool will be made for several reasons, according to Mr. McPherson.

He believes an attempt by any single auto maker to take a crack at the union would fail in view of the UAW's strength and strategy. As for a simple exchange of information, it is "scarcely a more attractive possibility" than individual bargaining, Mr. McPherson points out. It was tried briefly in 1955 and didn't work.

Joint Bargaining?—More appealing to the auto industry, says Mr. McPherson, is joint bargaining, the type practiced by steel producers in 1959. He thinks it could work in spite of union opposition.

He says it might also give auto bargainers a more solid legal foundation for an employe lockout as a form of strike aid, in case they decided to resort to such a measure. Otherwise, Mr. McPherson believes joint bargaining offers management little more than parallel bargaining.

Common Interest — There are other reasons why Mr. McPherson thinks parallel bargaining will give the Big Three maximum negotiating strength next year. "In the first place," he says, "we should look at the causes for its development and see if they'll be any less influential in 1961 than in 1958."

Presumably some of the causes will be even more influential next year. Among them are the inroads made by foreign cars in the U. S. market—still deep despite the advent of many new domestic compact cars—and mounting competition for the car buyer's dollar from other consumer good industries.

These are two reasons why auto makers will show a greater common interest in avoiding cost hikes in any form, according to Mr. McPherson.

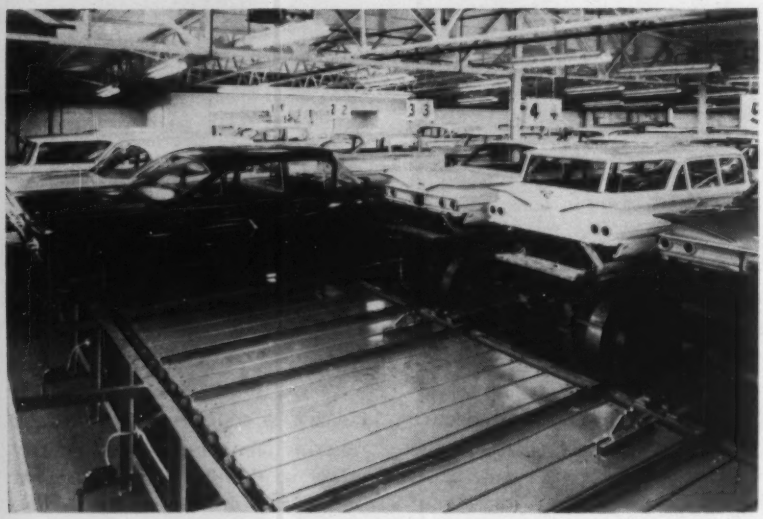
Stick With Success—For the first time in history, Big Three contracts will end at the same time, at midnight Aug. 31, 1961. Mr. McPherson says this will enable the union to "focus" its strike threat, to play one company against another, to pick out the weakest point in the industry's defense and capitalize on it—so making management cooperation a necessity.

A final factor in Mr. McPherson's parallel bargaining forecast is management's success with it two years ago. However, the agent that made it successful in 1958 may not be present next summer. This would be an economic recession with its 25 to 30 pct layoffs which weakened the position of the union in 1958.

Other Considerations—What if auto production and employment are high in 1961? Mr. McPherson says in this case a focused strike threat could be effective enough to keep the Big Three from carrying out parallel bargaining to the end. However, they could turn to some kind of strike pact to prevent a threatened company from giving in.

The strongest aid, according to Mr. McPherson, would be an understanding that a strike at one company would be followed by lockouts at the others. The companies aren't anxious to try this, he says, because its legality is more doubtful in the U. S. "than under the mature form of collective bargaining found in Scandinavian countries." There is also the possibility a lockout would have an adverse effect on public opinion and employe relations.

Auto Bodies Get Carried Away



HABEAS CORPUS: Storage line conveyors at right deliver car bodies to the exit conveyor in the foreground at Chevrolet's Janesville, Wis., plant. Sequence in which bodies leave storage area for assembly line can be programmed in advance in a Cutler-Hammer control center.

Popular 5040T now available with...

Detachable-TORQUE CONTROL BARS

make this a one-tool assembly line...

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Ingersoll-Rand's reliable, job-proved, built-in torsion bar torque control Impactools have paved the way for these new *Detachable* torsion bars. The popular 5040T Impactool is also available as the 5040TD, an ideal tool where limited production does not warrant the cost of several Impactools with built-in torsion bars.

Here's the economical answer to better quality control on fastening jobs that require different torques for the various nuts or cap screws. Now you can have a series of detachable bars, preset to the specific torques you require.

For example: slip on the 40 ft. lb. bar and run those three nuts—slip it off—put on the 50 ft. lb. bar and run the six cap screws—next the 30 ft. lb. bar, and so on. The Impactool shuts off automatically at each preset torque—quality control at its best.

How do you get it? Order a new Size 5040TD Impactool which has the built-in automatic shut-off device that is actuated by the preset torque control torsion bar. Then order as many torsion bars as you need. You can set the torque yourself with a vise and a wrench.

The Heavy-Duty bar is adjustable from 45 to 90 ft. lbs. The Light bar provides torques from 20 to 50 ft. lbs.

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offers unparalleled increases in die life and service—

corrects heat checking and cracking

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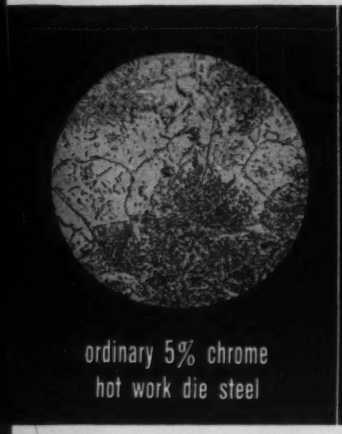
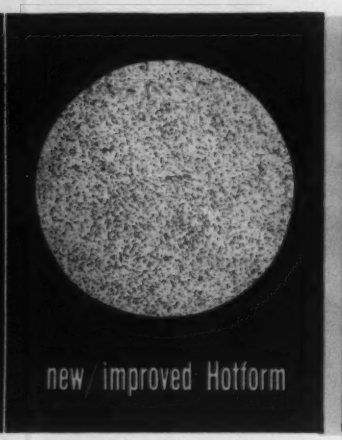


ordinary 5% chrome hot work die steel

Structure is typical of large sections of H-11, H-12 and H-13 type steels commonly on the market. Note carbide segregate and envelopes in grain boundaries. This structure persists through heat treatment to form lines of discontinuity that initiate cracks.

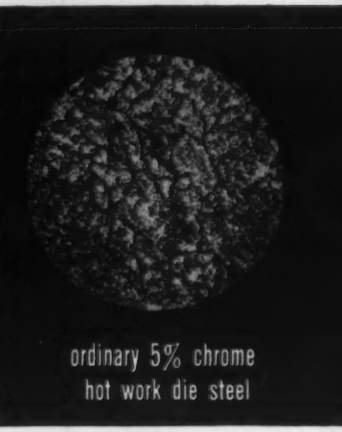


new/improved Hotform

Note uniform distribution of pinpoint carbides—freedom from carbide segregate in grain boundaries—freedom from carbide stringers. This structure, guaranteed in New/Improved Hotform, increases toughness and ductility of heat treated dies up to 35%.

new/improved Hotform

Structure of New/Improved Hotform after heat treating to Rockwell "C" 50. Note uniformity of structure that improves ductility.



ordinary 5% chrome hot work die steel

Note coarse grain with envelope structure. Die failures due to gross cracking invariably possess this structure or worse.

New/Improved HOTFORM's fine, uniform structure is the culmination of an intensive research and development program to assure longer die life in service. Now, greatly increased resistance to pitting, impingement soldering and heat checking make New/Improved HOTFORM more than ever your first choice for first quality hot work dies. Let us detail the vital facts for you!

TENSILE PROPERTIES

0.505" specimens; 3 tests per condition; heat treated simultaneously

Manufacture	Size	Location of Test	Hardness Rc	Tensile Strength psi	Ductility (Red. of Area %)	% Improvement
Standard	15½" sq.	Midradius Transverse	49.6	250,000	12.9	28
Improved	15½" sq.	Midradius Transverse	49.6	256,000	16.5	
Standard	8" sq.	Center Transverse	50.3	255,000	10.7	38
Improved	8" sq.	Center Transverse	51.4	265,000	14.8	

IMPACT PROPERTIES

Charpy V-notch specimens; 6 tests per condition; heat treated simultaneously

Manufacture	Size	Location of Test	Hardness Rc	Average Impact Strength ft.-lbs.	Statistical Scatter	% Improvement
Standard	15½" sq.	Midradius Transverse	51.6	10.8	±2.9	20
Improved	15½" sq.	Midradius Transverse	51.6	13.0	±1.8	

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Defense May Censor Contractors

Plan Calls for Review of All Media Public Will See

A new Defense Dept. plan calls for review of all speeches, printed matter and advertising by government contractors.

Opposition view is that this is in violation of guaranteed rights and suppresses freedom of speech.—By G. H. Baker.

▪ Executives of firms contracting to the Defense Department are on the verge of being able to speak only through a new Defense Department muzzle.

Under the guise of plugging leaks of defense secrets, the Defense Dept. is still studying a controversial plan to assume new and dictatorial powers over the speeches, press releases, and advertising copy originated by defense contractors and subcontractors.

Military Government — If the military leaders get away with this attempt to censor civilians, the Administration must then assume the blame for taking a long step toward replacing civilian government with military government.

It has long bothered the officials in the Armed Services that they cannot silence criticism from persons outside the defense establishment. They now aim to remedy this situation by forbidding all defense contractors and subcontractors to write, publish, or speak on any subject uncomfortable to the Pentagon.

In other words, if the proposal is approved, a word against the Defense Dept. and a contractor can be subject to serious reprisals.

Pentagon Prosecution — There's a possibility of prosecution by Pentagon lawyers under various security laws. And unfavorable publicity from the Pentagon public relations mill is assured. It amounts to a new contractor blacklist.

"Life or Death"—One of the leaders in the fight to preserve the freedom of speech for defense contractors is Rep. John E. Moss, D., Calif. He says the proposed regulation, if permitted to go into effect, "will do a great deal to prevent intelligent discussion of defense policies which may mean life or death to the United States."

The proposal would prevent any defense contractor from releasing information which (in the language of the proposed regulation) "could reasonably be interpreted as intended to influence the adoption, revision or cancellation of plans, programs, or policies of the government, including legislation."

"News" Expert—The final word on what may or may not be released lies with the Assistant Secretary of Defense for Public Affairs, a position now occupied by Murray Snyder. He is a long-time Eisenhower Administration expert of the "no news is good news" category.

Snyder insists he doesn't intend to abridge the right of free speech. But congressmen are finding it difficult to match up this statement with the substance of the proposed regulation. It very clearly inhibits the right to speak or write the truth, if the truth be uncomfortable to the Pentagon.

Actually, the Snyder regulation (if it is approved by Secretary of Defense Gates) is so broad as to allow the Pentagon to examine and censor all industrial advertising copy before it can be published.

Is More Labor Reform Coming?

▪ There is considerable fear among union officials familiar with the Washington scene that the labor movement isn't out of the legislative woods yet.

While they don't expect any additional union curbs this year, they are warning their members that last year's Landrum-Griffin Labor Reform Act may not be the end of their troubles.

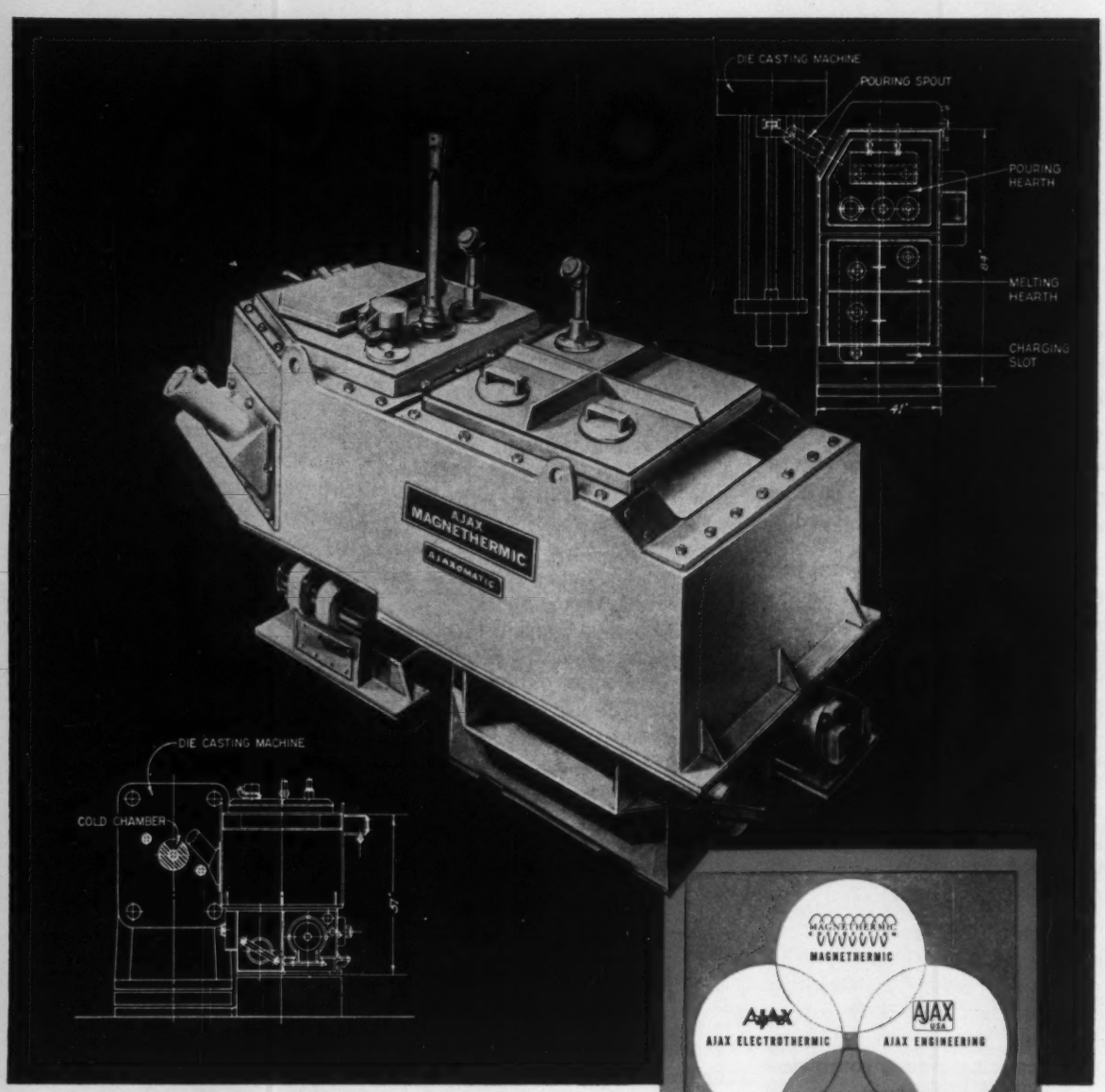
The Passed Word—Word is being passed to local and district officials of many international unions that what they term "anti-union" forces stand a good chance of gaining even tougher reform laws in 1960 or 1961.

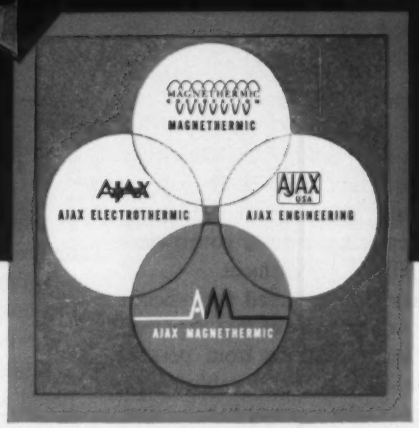
This warning is touched off in part by election-year pressures. The union officials hope it will help prevent any defections in the labor ranks at next November's elections.

They say in effect: "Labor must elect only its friends; we can't take a chance on any exceptions."

Reverse Swing—There's more to the warning, though. Many politically-wise union officials in Washington believe the pendulum is beginning to swing the other way. They think efforts to put the same kind of controls over unions that labor successfully won over business are beginning to pay off.

One of the more likely candidates for passage in the group of union control proposals is the plan to apply the antitrust laws—or a specially-tailored version of them—to today's massive labor organizations.





Duplex Ajaxomatic for melting and holding metal for automatic casting operations.

WATCH AM

FOR THE NEW IDEAS IN HEATING AND MELTING BY INDUCTION

The Automatic Pouring Ajaxomatic, one of many products by AM, for the heating or melting of metals by Induction.

"induction heating is our only business"

AJAX Magnethermic CORPORATION

GENERAL OFFICES
P. O. BOX 839
Youngstown 1, Ohio

TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio

Race Cars Tuned For Big Test

Los Angeles Is Big Maker of Cars in Memorial Day Run

Los Angeles car and engine designers and builders spark nation's interest in racing equipment.

Built-in air jacks and aircraft-type fuel injection are new features.—By R. R. Kay.

■ It's time for the annual torture-test of men, metal, and machines—the 500-mile Memorial Day speed classic. Car owners and racing enthusiasts around the world have their eyes on the Indianapolis Speedway.

The IRON AGE predicts:

1. Average speed to get into the race: 143 mph.
2. Top one-lap speed: 150 mph.
3. Average race speed: 136 mph.

Hot Rod Hot-Bed—Hot-bed for the multi-million-dollar race car and hot rod industry is in and around Los Angeles. There the car and engine designers and builders spark the nation's interest in racing equipment, hot rods, full-size and midget racers. It's still a fast-growing field.

This is what you'll find when the 33 starters line up May 30th: Over 25 of them are California-built.

Laid-Down in L. A.—All the engines are Los Angeles products: 31 Offenhauser 4-cylinder 255-cu in. engines built by Meyer & Drake Engineering Corp., Los Angeles; and the two Winfield-designed 8-cylinder supercharged engines for the Novi cars. It's unlikely any other power plant will break into the race.

The trend is still toward laid-down engines. It's a design feature that turned up at the track a few years ago. The car that tried it won the race and kicked off the trend. The engine is laid-down at 18 degrees from horizontal. Purpose: Lower center of gravity and improved handling around curves.

Cars to Watch—Keep an eye on these new cars:

A. J. Watson's 1960 series of six new racers. His Leader Card Special won last year. Big feature in the new ones is a set of three built-in air jacks. They're for high-speed tire changing during pit stops. An air hose in the pit plugs into the car and raises it clear in 0.3 second. It lets it down in 0.7 second.

The Metal-Cal Special built by George Salih. His cars won in 1957 and 1958 with laid-down engines. This year's new car weighs under 1600 lb. The car's highest point is 37 in.—from ground to tip of tail fin.

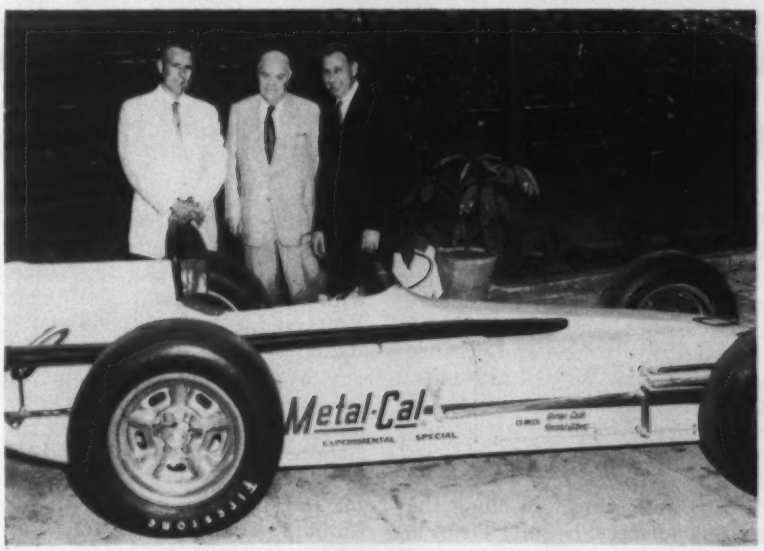
Novi's Try Again—This year the famed Novi engines will try aircraft-type fuel injection. Tests on the California dry lakes at speeds over 200 mph showed this new system could keep constant air-fuel ratio at almost any engine speed.

Steel for Polaris

Contracts totaling more than $600,000 for three buildings at the Polaris missile base, Point Mugu, Cal., have been awarded to the P. I. Steel Corp.

The entire job will require 1600 tons of structural steel and 42 hanger doors.

P. I. Steel was also awarded contracts totaling $80,000 for more than 150 tons of structural steel for construction of a warehouse and other buildings to be built at Point Mugu by Diversified Builders, Inc.



BRICKYARD CHARIOT: Jimmy Bryan (left) will drive the Metal-Cal Special for owner Phil Coffer (center) in this year's Indianapolis Classic. The new car was designed and built by George Salih (right).

Quality . . . the best economy of all

Fight the cost of "Stick-Slip" with Sunoco Way lubricant

"Stick-slip", the alternate grabbing and releasing of slow-moving carriages, can seriously score machine ways and ruin fine workpiece finishes.

Avoid this trouble and expense with Sunoco Way Lubricant, known throughout the world for its ability to cure "stick-slip". Special ingredients in Sunoco Way Lubricant form a durable, reinforced lubricating film along the mating surfaces. Result: There is no metal-to-metal contact even during week-end shutdowns; machines start easily; carriages move without intermittent grabbing. YOU GET FINER FINISHES, FEWER REJECTS.

Ask your Sun representative to show you how others have benefited by using Sunoco Way Lubricant. Or write to Dept. IA-5 SUN OIL COMPANY, *Philadelphia 3, Pa.* In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

Labs Hit Noise and Vibration

Twin Foes May Soon Be Harnessed, If Not Eliminated

The stepped-up drive against sound and vibration stems straight from the profit motive.

Improved quality, better control, and human factors are considerations in battle against old foes.—By R. H. Eshelman.

■ Vibration and sound are two unwanted and unnecessary by-products of industrial equipment. So say research engineers. And R & D efforts increasingly are being focused on these twin specters. Soon they may be harnessed if not banned completely.

Perhaps part of the problem of many plants is that they haven't received full attention up to now.

Profit Motive — However, the stepped-up drive against vibration and sound stems straight from the profit motive, as well as other common-sense reasons. With the new ceramic tools, vibration is a real enemy of production. Machine designers are well aware that reduction of vibration and sound are necessary for greater precision.

Improved surface finishes, control of geometric shape in turning or grinding, control of thickness, accurate tension or pressure controls are all a function of the magnitude and frequency of vibration and/or sound to which the workpiece or machine tool is subjected. So says Robert B. Edminston, senior engineer of a-c motor engineering group of Westinghouse Electric Corp.

Operator Involved — He notes that on jobs controlled by an operator, degree of precision attained is also a function of the environmental noise and vibration. Aside from operating skill, speech interference and annoyance from noise and vibration affects quality of work turned out.

Then, too, look at it as a labor relations matter. These twin offenders can be costly. Many state laws award compensation to an employee for partial or total deafness. This growing problem is spurring industry to greater strides toward control. Some manufacturers now are including noise specs in contracts for new machinery. Many list sound-pressure limits for each octave band.

Even local governments are taking the cue with an eye to regulations curbing plant noise.

Military Problems—Since source of both vibration and sound is rotating and moving components, machine designers don't stand alone. Military hardware makers have been combating these enemies for years, especially in underwater craft. Mr. Edminston suggests that machine builders can take a leaf from weapons designers.

Motors far beyond present industrial needs, for instance, are already in use in these other fields.

Spare Bolster Boosts Output

IDEA SPREADS: Roller-skate concept takes over in press field, giving stampers spare bolster. It's loaded while press is in full production. Carl Pearson, Fisher Body engineer-in-charge, machinery and equipment department, General Motors Tech Center, studies a 3-D model.

INDUSTRIAL BRIEFS

Complete System — Allis-Chalmers Mfg. Co. will build a multi-million dollar engine manufacturing plant at its Harvey, Ill., works. It will enable A-C to build a broad line of diesel, natural gas, butane and gasoline engines. When completed, in mid-1961, A-C will have a straight line production system in machining, assembling and testing engines.

Line Transfer—The testing machine product line of the Electronics & Instrumentation Div. of Baldwin-Lima-Hamilton Corp. has been transferred to Wiedemann Machine Co., King of Prussia, Pa. This transfer does not include the Baldwin SR-4 Strain Gages, transducers and associated instrumentation. The testing machines will continue under the Baldwin trade name.

Election Time—N. J. Dunbeck is the new president of the American Foundrymen's Society. He is vice president, Industrial Minerals Div., International Minerals & Chemical Corp. A. L. Hunt, Superior Foundry Co., Cleveland, has been elected vice president of the Society.

The Winner—R. K. Hopkins, of Firth Sterling, Inc., has received the Achievement Award in Metallurgy for 1960 from the American Society for Metals, New York chapter. Mr. Hopkins invented the Hopkins process. It is a technique for producing ultra-pure alloys.

Oven-Hot—Two Pittsburgh district firms will construct a new 200-unit non-recovery coke oven installation at Calvert City, Ky. They are the Connellsville Mfg. & Mine Supply Co. of Connellsville, and Femco, Inc., of Irwin. The Calvert City plant is being built for the New York Mining & Mfg. Co.

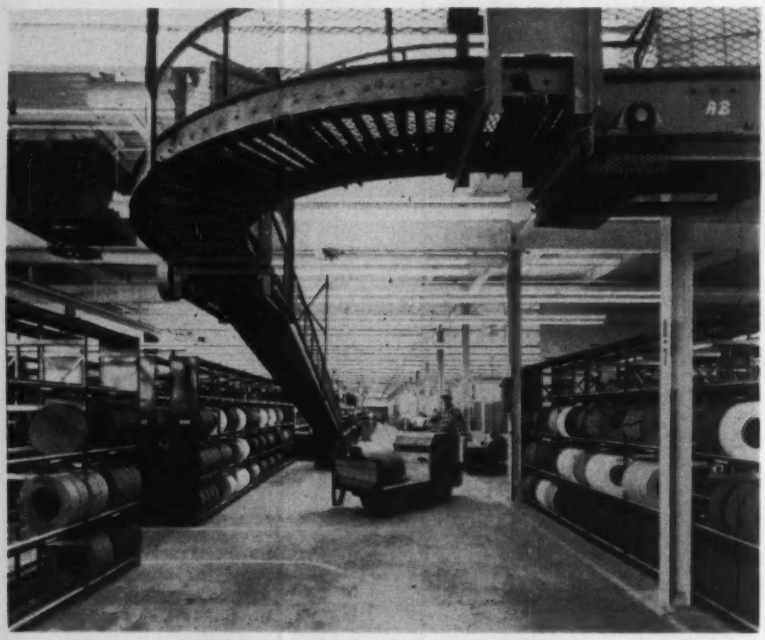
Research Medal — Dr. A. B. Kinzel, vice president, research, Union Carbide Corp., has received the Industrial Research Institute's 1960 medal. Dr. Kinzel has also received acclaim for service to governmental and academic research and for his own scientific accomplishments in metallurgy. He is a member of MIT Corp., the National Academy of Sciences, and past president of the AIME.

Space Furnace — The National Aeronautics & Space Administration has purchased an electron beam melting and casting furnace from the Stauffer Temescal Co., Richmond, Calif. It is used for research in high temperature refractory metals and alloys. The furnace will be installed at NASA's Lewis Research Center at Cleveland, O.

Sold — Ingersoll Products Div., Borg-Warner Corp., has acquired the Elgin Metalformers Corp. The Elgin Co., generally known under the trade name, EMCOR, is a supplier of metal modular-type enclosures. EMCOR will be operated as a part of Borg-Warner's Ingersoll Products Div., headed by J. H. Ingersoll, president.

Taking Charge—C. E. Herington, president, Herington Advertising, Inc., New Rochelle, N. Y., has been appointed secretary-treasurer, Foundry Facings Manufacturers Assn. Mr. Herington also acts as executive secretary for the Metal Treating Institute and the Ultrasonic Manufacturers Assn.

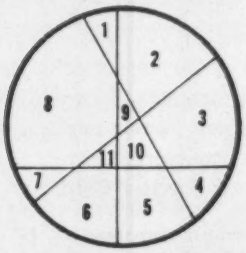
New Plans and Plants at 75



NORTON ANNIVERSARY: Norton Co. is building its current 75th anniversary celebration around its new $6.5 million plant to manufacture organic bonded grinding wheels. Above is a general view of the stock area of the new plant at Worcester, Mass. The company has 26 miles of shelves holding 6 million grinding wheels ready for fast shipment.

(Advertisement)

Solution to problem on page 8



The obvious answer is 8 segments. However, you can actually make 11. In selection and application of steel, aluminum, plastics and metalworking machinery, don't settle for the obvious. Be "Metalogical"—call Ryerson.

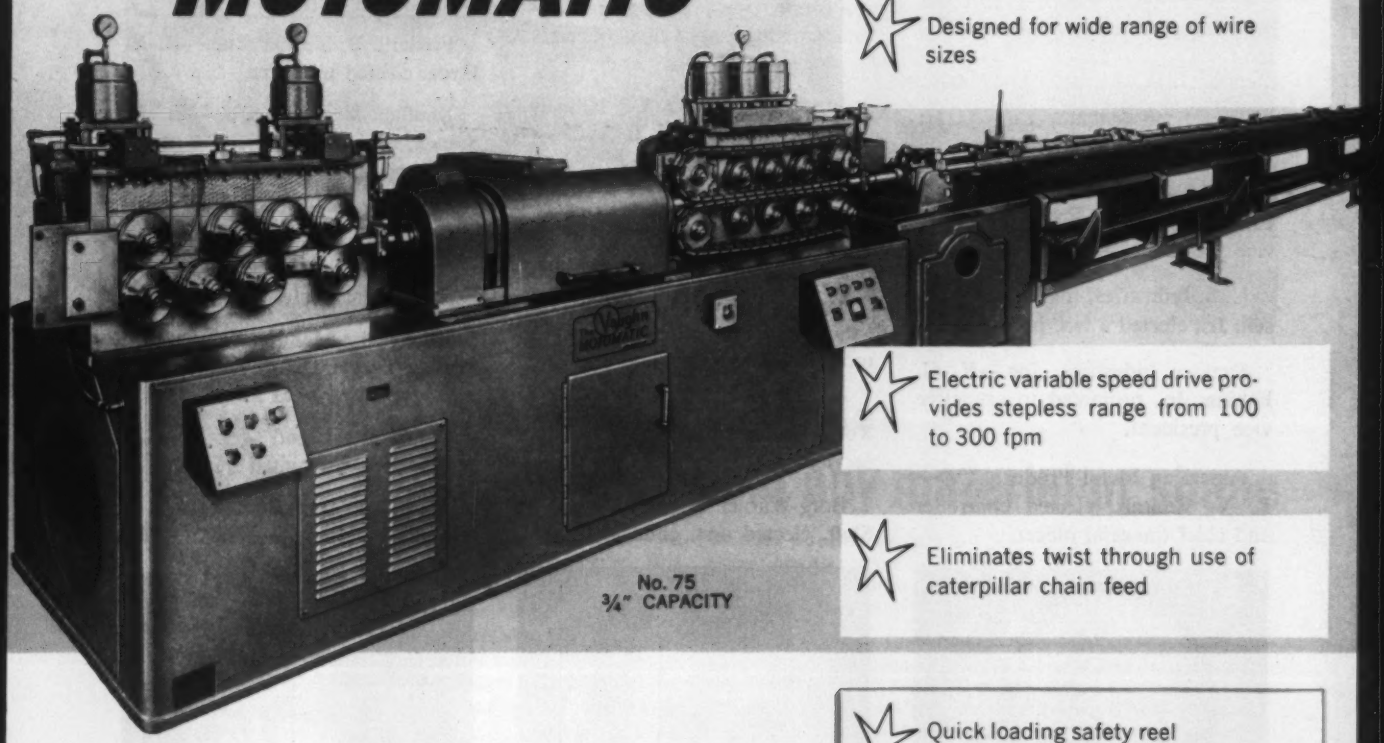
EVERY FEATURE

for the volume processing and uniform cutting of

STRAIGHT WIRE

up to 300 feet per minute!

The Vaughn® MOTOMATIC



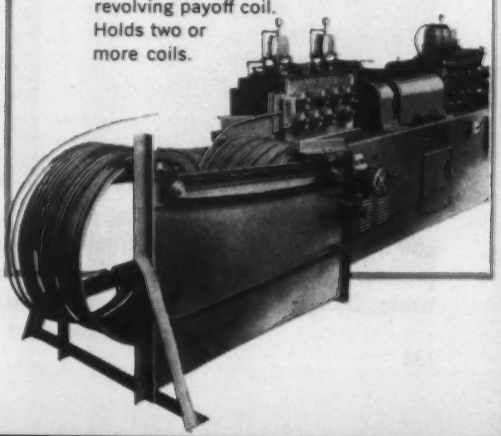
- Delivers uniform diameter bars and precision-cut lengths
- Designed for wide range of wire sizes
- Electric variable speed drive provides stepless range from 100 to 300 fpm
- Eliminates twist through use of caterpillar chain feed

This efficient Vaughn machine affords automatic production of straight, cut lengths direct from the coil, processing the entire coil from end-to-end, and reducing scrap to an absolute minimum. Built to high Vaughn standards of smooth operation, low maintenance and long service life, the Motomatic increases production while reducing labor time and fatigue—a dividend-paying investment year after year. • Send for Motomatic Bulletin No. 751.

The VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT . . .
Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

- Quick loading safety reel
  –facilitates starting wire coils into machine and protects operator from revolving payoff coil. Holds two or more coils.



J. W. Hopper, named asst. to the president, Pratt & Whitney Co., Inc.

The Heald Machine Co.—**L. H. Cousineau,** elected president.

Fischbach & Moore Inc.—**H. W. Christensen,** appointed executive vice president—commercial.

U. S. Industries, Inc.—**J. H. Cassell, Jr.,** elected a vice president.

Dresser Industries, Inc.—**F. G. Fabian, Jr.,** promoted to executive vice president.

American Metal Products Co.—**L. V. Braknis,** elected controller and chief financial officer.

Consolidated Electrodynamics Corp.—**R. H. Garretson,** appointed executive vice president; **R. L. Thompson,** appointed manager, creative services.

Udylite Research Corp.—**R. A. Fellows,** elected vice president.

Vickers Inc. — **M. A. Hayden,** elected a vice president.

Mirro Aluminum Co.—**A. L. Vits,** named president and chief executive officer; **W. F. Bugenhagen,** becomes chairman of the board.

Signode Steel Strapping Co.—**R. N. King,** appointed director, foreign sales.

Dravo Corp.—**I. L. Hillman,** named treasurer and **J. V. Newman,** named controller.

Jones & Laughlin Steel Corp.—**T. M. Hogan,** appointed manager, export sales, New York.

The Carpenter Steel Co.—**T. E. Murphy,** appointed asst. manager, tool steel sales, Reading, Pa.

Sperry Gyroscope Co.—**P. A. Toll,** appointed director, building services.

Borg-Warner Corp. — **Franklin Sloff,** elected asst. controller.

H. E. Hanson, named vice president, Fairbanks, Morse & Co. and appointed general manager, Beloit Div., Beloit, Wis.

Frederic B. Stevens, Inc.—**R. L. Hyde,** elected treasurer.

Keuffel & Esser Co.—**W. C. Spinck,** appointed Detroit sales manager; **G. F. Benkert,** appointed Detroit branch manager.

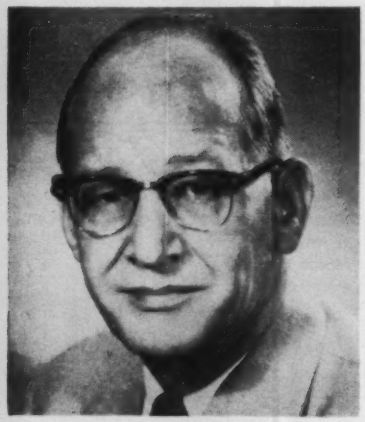
Aluminum Co. of America—**R. L. Ekholm,** appointed manager, Omaha branch sales office.

Rockwell Manufacturing Co., Walker-Turner Div.—**V. N. Turco,** named district sales manager.

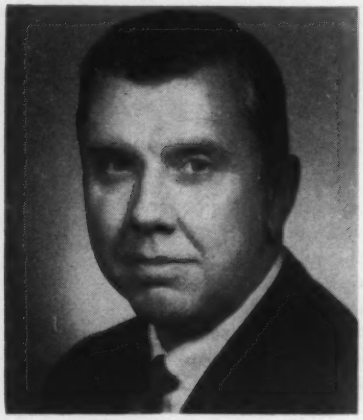
Plume & Atwood Mfg. Co.—**A. P. Raeburn,** appointed treasurer.

Brush Instruments, Div. of

(Continued on P. 141)



E. L. Dahlund, appointed general manager, Diesel Engines, Compressor, Locomotives Group, Fairbanks, Morse & Co.



L. E. Grubb, elected vice president, sales, Huntington Alloy Products Div., The International Nickel Co., Inc.

E. M. Kline, elected vice president, operations, Huntington Alloy Products Div., The International Nickel Co., Inc.

How Allison Wheels help you get

Quick, accurate cuts on almost any material or shape

• Abrasive cutting can give you *cleaner* cuts, *faster*—on almost any material from titanium to fire brick. But only when you use the proper cut-off wheel can you get the best results. That's where your ALLISON-CAMPBELL Field Engineer can help. Show him your cut-off problem, and he can select the ALLISON wheel that will cut your metals and other hard materials at speeds of just a few seconds per square inch—fine finish, without burn and with little or no burr—accuracy within close tolerances.

No matter what cut-off problem you have, chances are the right ALLISON wheel will do the job more quickly, less expensively, and more accurately than any other cut-off method. There's a complete selection of ALLISON wheels for every abrasive cutting application.

• • •

Resinoid bonded wheels are designed specifically for dry abrasive cutting machines. They cut at rates of 3 to 5 seconds per square inch, will cut 2″ x 2″ hardened steel on a standard chop stroke machine in 16 seconds.

Rubber bonded wheels are used primarily for wet cutting operations to obtain the finest quality cuts on all types of steel, alloys, titanium, glass, and plastics. Rubber bonded wheels are sometimes used for cutting tubing dry with minimum burr.

Masonry cutting blades, including reinforced types, are available for both wet and dry cutting of such materials as fire brick, concrete block, glazed tile, and transite. Use of the proper ALLISON wheel can reduce down-time for furnace repairs by speeding the installation of refractory brick.

Fiberglass reinforced wheels provide high cutting speeds while giving extra strength for many foundry cutting jobs. They're available in both resinoid and rubber bonded types, help prevent accidents and costly breakage.

GET THE COMPLETE STORY! Write for **Bulletin DH-214** for detailed information on abrasive cutting techniques, and the wide selection of ALLISON wheel specifications. ALLISON wheels are available 3″ to 34″ diameter, .006″ to 3/16″ thick. And remember—your ALLISON-CAMPBELL Field Engineer can give you specialized help. His know-how is your assurance of the efficient, accurate, and economical cutting you can expect from modern abrasive cutting techniques.

ACCO TRADE MARK

ALLISON ABRASIVE CUTTING WHEELS

Allison-Campbell Division • American Chain & Cable Company, Inc.

927 Connecticut Avenue, Bridgeport 2, Conn.

CORRECT LUBRICATION IN ACTION...IN AN EMERGENCY!

FROM DOUBLE DISASTER

ATCHISON DAILY GLOBE
Charles Kennedy, Who Died In Today's Flood, Was The Man Who Inspired The "Professor" So Often Quoted In This Line
DEVASTATING FLOOD HITS ATCHISON
10-Foot Wall Of Water Razes Buildings In Downtown Area; Two Perish; Loss In Millions
Torrent Follows Early Morning Storm; Traps Many In Their Homes
Atchison Will Rebuild
WATER DANGER!
Respond To Emergency
Mobilgas

Action shown here recalls the 1958 flood disasters in America's largest all-electric steel foundry operated by LFM Company, Atchison, Kansas. This division of Rockwell Manufacturing Company is one of the largest valve manufacturing plants in the world and a leader in steel-casting experimental work.

Mobil Correct

TO FULL PRODUCTION !

How Mobil helped LFM Company keep disaster costs to a minimum . . . return production to normal after two floods within three weeks.

ATCHISON, KANSAS; JULY 1958:

It couldn't happen—but it did! A second vicious flood only three weeks after one had ripped through the LFM Company's plant in Atchison, Kansas.

In both floods Mobil engineers speeded emergency aid, putting in 288 hours of voluntary service, working shoulder to shoulder with LFM personnel on many aspects of the disaster problem.

- Located and sent in portable pumps to flush out contaminated oil reservoirs.
- Trained people to flush, clean and rust-proof machines and parts.
- Prepared tanks for removing rust from corroded parts—by lining with wax, installing racks and filling with rust-removing acid.
- Obtained dispensing equipment to replace that missing.

As a result of this kind of help, 897 finished worms for motor driven valves were saved and delivered to the customer on time . . . saving LFM $36,000. In addition, 1705 gallons of oil were identified and reclaimed. Everything possible was done to protect machines and restore normal production.

This is Mobil Correct Lubrication in Action in an emergency! The remarkable cost-cutting lubrication program that's helping leading industries cut costs and improve profits. Why accept less for your plant?

SAVINGS *DURING NORMAL PRODUCTION THROUGH CORRECT LUBRICATION IN ACTION!*

Drill tapping speed increased . . . tool life extended 316%. Troublesome radial-drill tapping operation at LFM was studied by Mobil representative. He recommended use of a Mobil cutting fluid. This product increased number of holes tapped between tool changes by 316%. Tapping speed was increased 89%.

Storage problem solved—$11,388 saved. Storage of unmachined castings posed problem for LFM. Outdoor storage was desirable but castings rusted, had to be sandblasted before they could be finished. Mobil recommended rust preventive that eliminated sandblast . . . reduced handling time . . . saved $11,388.

MOBIL OIL COMPANY
150 East 42nd Street, New York 17, N. Y.

Lubrication

JIM SMITH IS BUILDING YOUR 1970 CAR

Pressed for a prediction, Jim Smith says you may be driving an "all-aluminum car" by the mid-70's. It's one of the things Alcoa's Development Division is working on, hand in glove with Detroit, from power plant to chassis and body. Take aluminum engines — Jim and the 49-man crew in the Development Division's automotive laboratories helped put them on the road. They laid the groundwork for a workable rocker arm . . . explored ways to let pistons and rings run directly on aluminum cylinder walls . . . confirmed previous conclusions that the aluminum engine can use lower octane fuel than cast-iron engines. Credit them, too, for a key assist in developing the aluminum radiators, bumpers, transmission housings and combination hub-wheel-brake drums in use on famous-name cars and trucks.

Like Jim Smith, 93 other Development Division engineers and designers share their aluminum knowledge with manufacturers of a wide variety of new consumer, military and industrial goods — diesel engines, compressors, missiles, army tanks, farm equipment, portable power tools, appliances and scores more. It's a service unmatched by any other light metals company and it's yours to call on — one more added value we put into every pound of Alcoa® Aluminum you buy. Aluminum Company of America, 2018-E Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

helps you design it, make it, sell it

Alcoa has hundreds of Jim Smiths to help you design it, make it, sell it

All of Alcoa's skills are mobilized to a single purpose: To put more than just 16 ounces of metal in every pound of Alcoa Aluminum you buy. Here are 12 of the dozens of ways to do it:

1. Research Leadership, bringing you the very latest in aluminum alloys and applications.

2. Product Development by specialists in your industry and your markets.

3. Process Development Labs for aid in finishing, joining and fabricating.

4. Service Inspectors to help solve production problems at your plant.

5. Quality Control to meet top standards or match your special needs.

6. Complete Line including all commercial forms, alloys, gages, tempers.

7. Availability via the nation's best stocked aluminum distributors.

8. Foremost Library of films and books to help you do more with aluminum.

9. Trained Salesmen with a wealth of on-the-spot information.

10. Sales Administrators constantly on call to service your orders.

11. Year-Round Promotions expanding your old markets, building new ones.

12. The Alcoa Label, leading symbol of quality aluminum, to mark your goods.

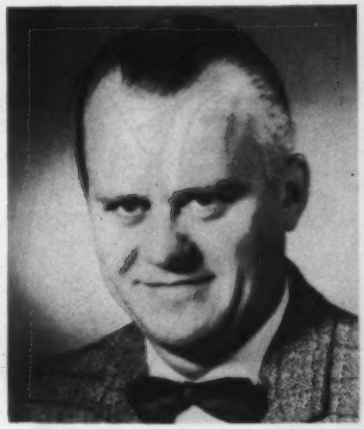
Added Values With Alcoa Aluminum

. . . is a case book of Alcoa special services and a guide to their availability in design, manufacture and sales. Your copy, with some of the most rewarding information you may ever read, is waiting and it's FREE. Write: Aluminum Company of America, 2018-E Alcoa Building, Pittsburgh 19, Pa.

(Continued from P. 136)

Clevite Corp.—**L. B. Dunn,** appointed quality control manager.

Metal & Thermit Corp., Welding Products Div.—**O. H. Young,** appointed manager, west central region.



E. W. Ruhe, promoted to chief engineer, Engineering and Maintenance Dept., Metals Div. plant, East Alton, Ill., Olin Mathieson Chemical Corp.

A. M. Byers Co.—**W. H. Harper,** elected secretary.

Union Carbide Metals Co., Div. Union Carbide Corp.—**G. E. Smith,** appointed salesman, Detroit office.

Gerald Lewis, appointed director, product development, Cooper Alloy Corp.

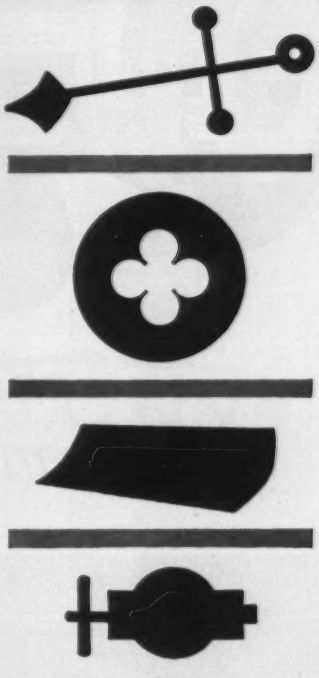
J. Bishop & Co. Platinum Works —**W. H. Braun,** appointed chief metallurgist, all divisions; **Dr. J. B. Hunter,** appointed manager, chemi-

(Continued on P. 144)

Maine Quiz #1

Can you identify these metal products produced in

MAINE?



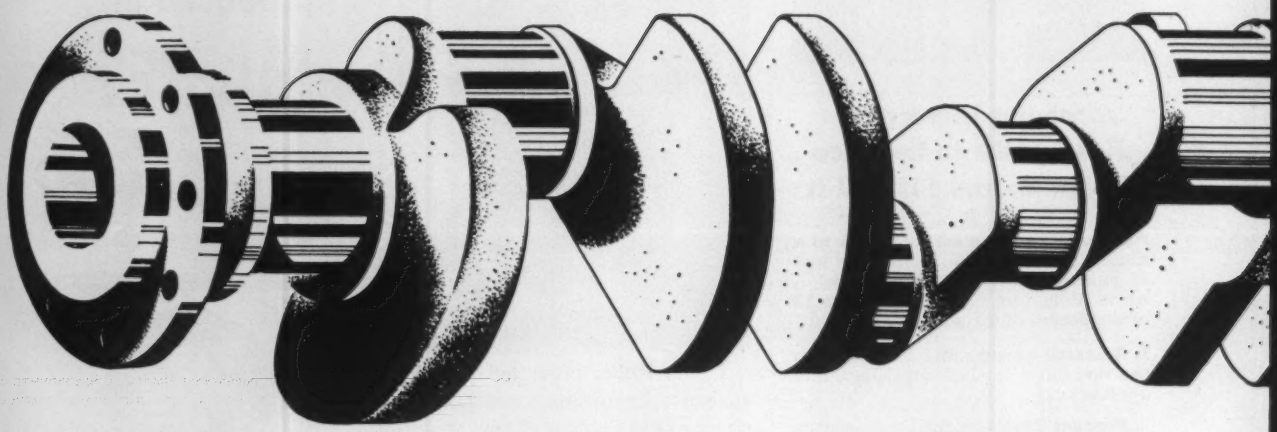
Answers — 1. Boat Anchor
2. Cutting Die, 3. Bulldozer Blade
4. Industrial Valve

Currently 150 metal working plants manufacturing machinery and ordnance parts, fabricated metal products, transportation equipment, and primary metal products are located in Maine. Over 5000 skilled workers produce thousands of machine tooled products daily.

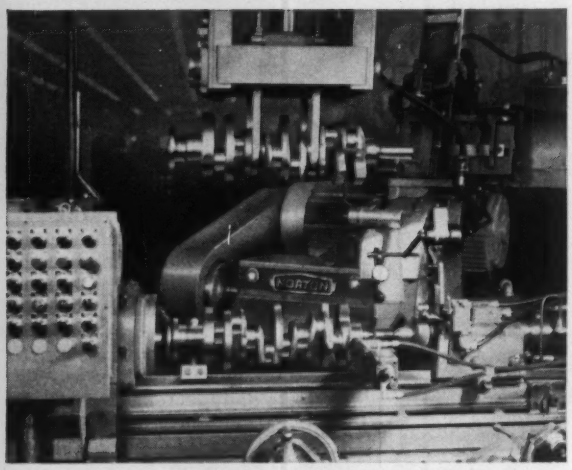
Maine will produce the item of your choice. *Maine is the state for your new plant.* Write for our 56-page directory of the metal working industry in Maine and the *plan for 100% financing of new construction.*

Lloyd K. Allen, Commissioner
Maine Department
of Economic Development
State Capitol Augusta, Maine

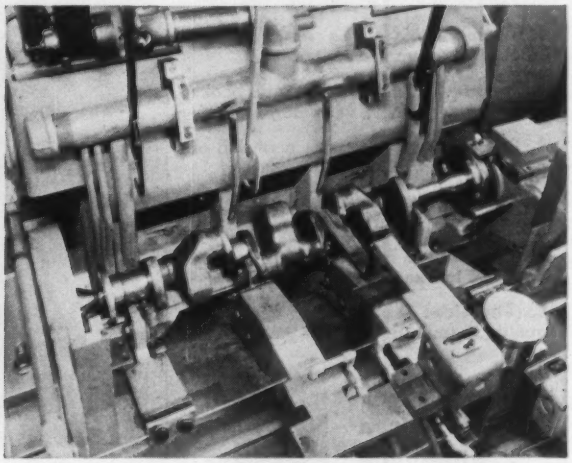
If you grind crankshafts . . .



check how NORTON grinders can reduce your costs-per-shaft



Grinding Gear Fits and shoulders is easily handled on a Norton Type C-V 4 Angular Wheelslide Grinder. By grinding thrust surface and adjacent diameter in a single, automatically controlled plunge grind, the Type C-V 4 provides fastest production with less effort.



Grinding All Main Bearings At Once is a job for the Norton Type CM-1 Semiautomatic Heavy Duty Multi-Wheel Grinder. Precise finishing of a group of line diameters about as quickly as a single diameter grind assures important cost-savings. Also popular in this multi-wheel application are Type CTU Heavy Duty Cylindrical Grinders.

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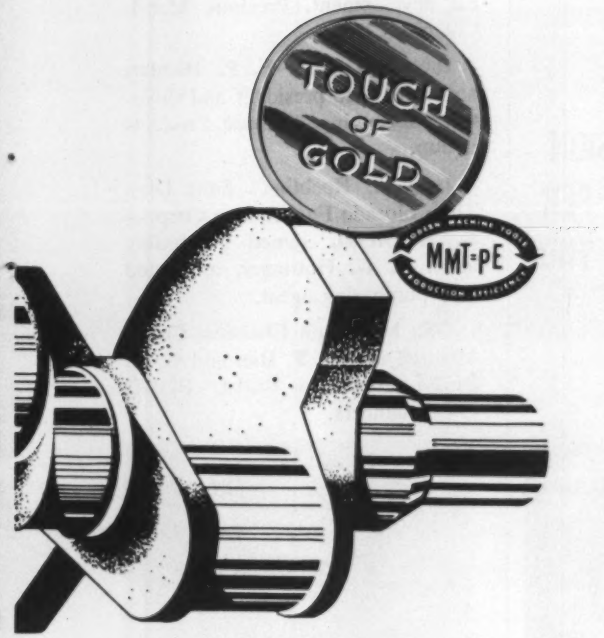

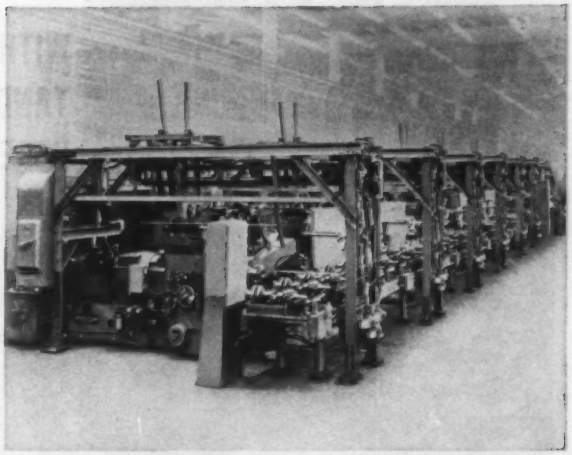

Automatic Grinding of Crankpins on a multi-station basis is handled on the No. 2 Unitized Transfer Type Crankpin Grinder. This machine combines loading, positioning, grinding, gaging, transferring and wheel-truing — a sensational advancement for big volume crankshaft production.

For further facts on how these grinders can benefit you, see your Norton Man, a trained grinding engineer. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

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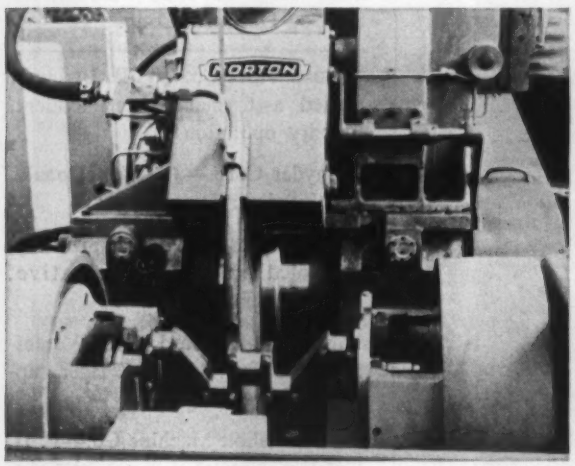
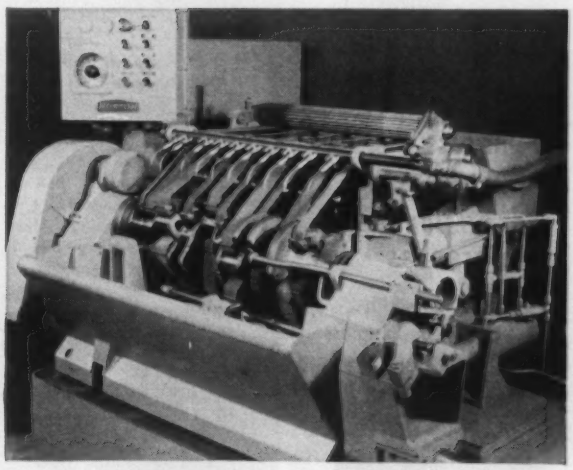


Simplified Grinding of Pins on shafts up to 72" long is the specialty of Norton Type CC-8 CRANK-O-MATIC* Semiautomatic Crankpin Grinders. Automatic cycling under semiautomatic control frees the operator from supplementary operations. Similar advantages for grinding pins on small shafts are provided by Norton Type CTU CRANK-O-MATIC Grinders.



Lapping Pins and Bearings simultaneously in an automatic cycle calls for the Norton No. 31 CRANK-O-LAP* Lapping Machine. Strips of coated abrasive are used as the Lapping medium in producing top-quality finishes. With headstock and footstock carried as a swing frame, manual operation is reduced to easy loading, pushing the "Start Cycle" button and unloading.

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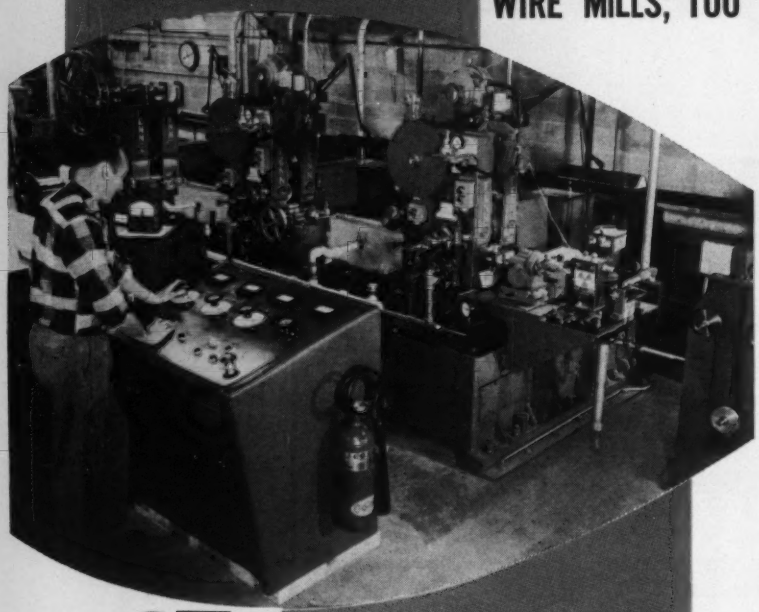

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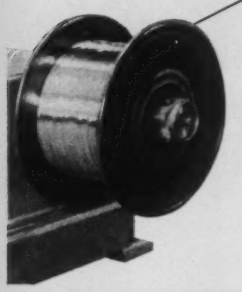

This Fenn line exemplifies the finest in high speed precision wire flattening. It was engineered and built by Fenn to produce from an entry round thin copper tape with critical dimensions at continuous production speeds in excess of 900 fpm. The installation consists of a Fenn Model 082 three stand tandem mill with separate DC variable speed drives. Each stand has carbide shell rolls with both internal and external cooling. Between stands are Fenn No. 51 power-driven edgers and coolant troughs. Exit tape is automatically gaged by electro-limit width gage and Beta Ray thickness gage. Tension and speed synchronization are regulated by dancer roll controls between stands, and at exit end to synchronize the take-up reel which must traverse wind the tape with great precision for the next operation.

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(Continued from P. 141)

·cal development, Precious Metals Chemical Div.

Daystrom, Inc.—**F. P. Diemer,** appointed vice president and director, engineering, Defense Products Group.

John A. Roebling's Sons Div., The Colorado Fuel & Iron Corp.—**K. S. Dickel,** named purchasing agent; **J. G. Hottinger,** appointed asst. purchasing agent.

Olin Mathieson Chemical Corp., Metals Div.—**E. F. Rau** and **G. A. Beebe,** appointed ROLL - BOND sales engineers.

W. C. Heard, elected vice president, sales, Capewell Manufacturing Co., Hartford, Conn.

Sloan Valve Co.—**V. B. Utzinger,** named asst. plant superintendent, foundry operations.

Snyder Corp.—**J. J. MacDonald,** appointed service manager.

L. B. Foster Co.—**Tom Kelly,** appointed sales representative, Houston office.

National-Standard Co., Worcester Wire Div.—**Fred Krieger,** appointed metallurgist.

The Gisholt Machine Co.—**P. H. Gotstein,** appointed direct sales representative, Atlanta, Ga., territory.

Republic Steel Corp., Union Drawn Steel Div.—**W. A. Carter,** appointed service chief, Gary, Ind., plant.

La Salle Steel Co.—**W. J. Trifiro,** named a sales representative.

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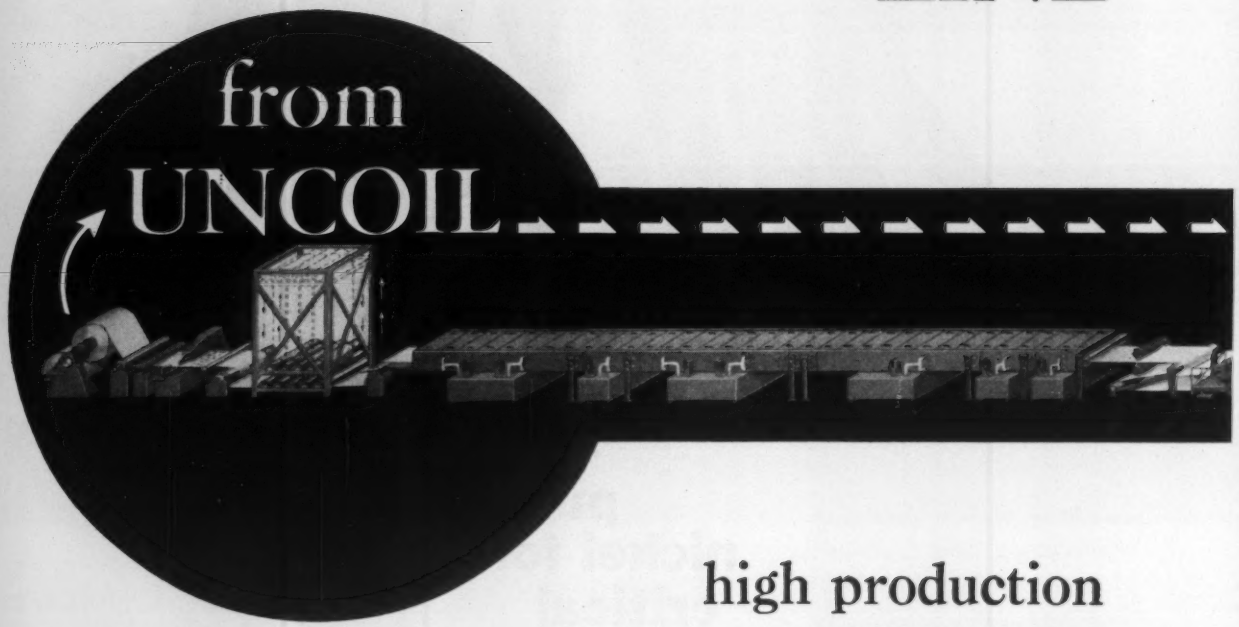
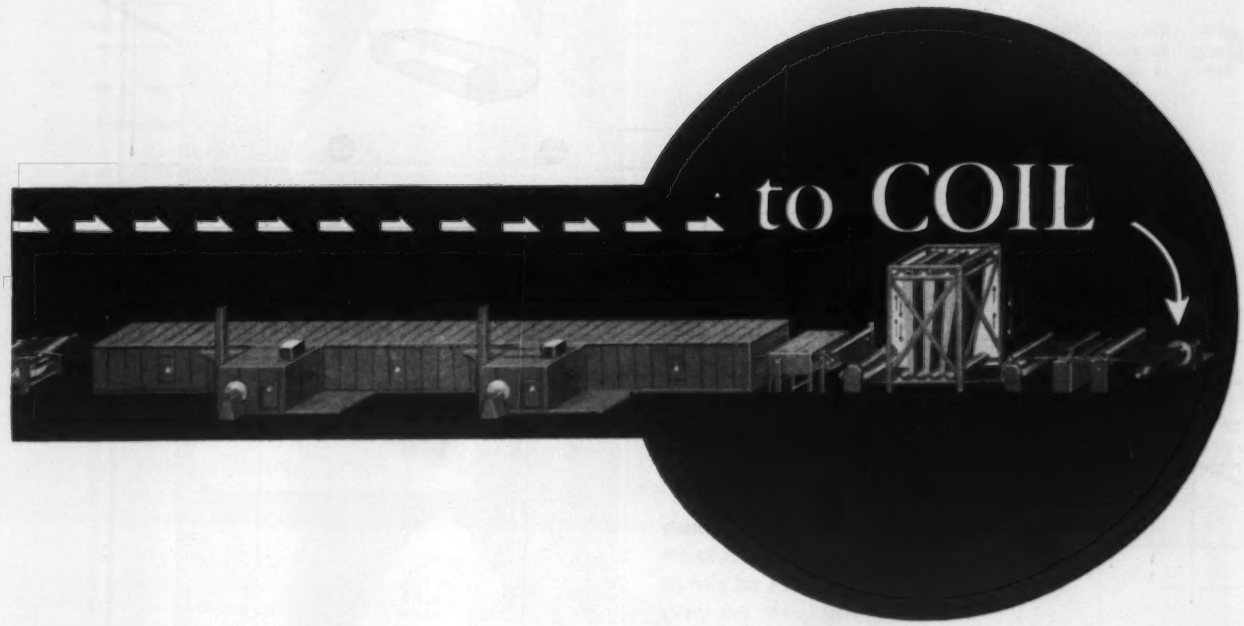


high production machinery for quality coating of aluminum and steel strip



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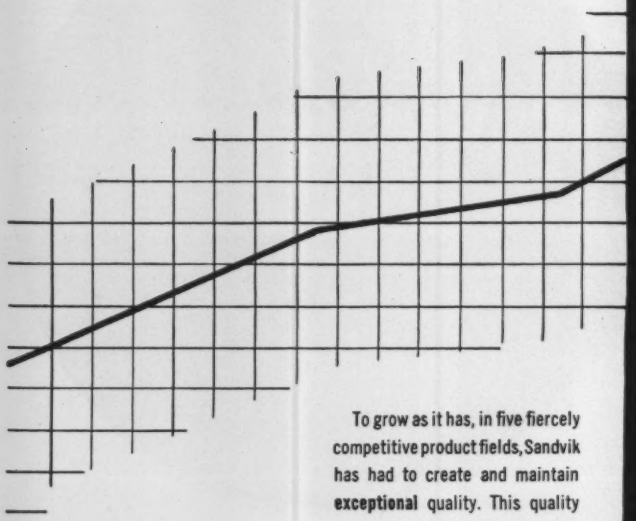

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Centralized Engineering Staff Puts Talent on Diverse Jobs

Diversified companies find that unified direction of engineering and product development offers many advantages.

It cuts overhead, brings top talent to all product lines.

By R. H. Eshelman,
Machinery Editor

■ Today's accelerating trend to product diversification, even by many middle-size firms, creates new problems for technical managements.

Markets that veer and tack in changeable consumer winds signal an era in which company success can no longer follow a static line. Indeed, modern business organization must go through a constant process of reappraisal.

Demonstrating that a company need not be an industrial giant to be attuned to change is Dura Corp., Detroit. This company's top management declares that its energies are directed toward maintaining its future rate of progress.

Direct Effort—On this front, its attack is channeled into three major areas: improved and broadened product lines, more efficient organization, and better profits through cost reduction and distribution techniques.

"Our organization is inspired by our opportunities," says J. Thomas Smith, President. "Within the framework of our present products, there is considerable opportunity for broadening the lines and increasing sales and profits."

Looking at these goals, Mr. Smith notes that the problem of product development is paramount among all American businesses. "Business managements in recent years have increased their expenditures sharply for research and engineering," he notes. "However, the record shows that increased expenditures do not of themselves produce new products for the waiting markets," he warns.

TEAMWORK COMES THROUGH: Dura Corp. executives J. Thomas Smith (right), President, and P. G. Frerer, Director of Engineering, look over some of the company's new product developments, such as tiller.

Why a Central Staff—One way to

get the most mileage out of R & D money, Mr. Smith points out, is with a centralized technical staff. Not only can you command high caliber abilities, but you can give them better equipment and facilities. Resultant effort is far superior to what can be achieved by separate, scattered groups.

Reflecting this philosophy, Dura recently completed its up-to-date administration and technical center in the Detroit area. Its manufacturing plants range from Monroe and Ypsilanti, Mich., Toledo, Zanesville, O., through Springfield, Ill., Richmond, Ind., and Elizabethtown, Pa.

Present products are broadly diversified: components for the automotive industry, lawn and garden equipment, automotive service equipment, agricultural implements, home and hospital contour beds, aluminum castings and items in the capital goods field.

Taking note of the many problems and pitfalls in new product development, Mr. Smith emphasizes, "one must be optimistic and have great confidence in the quest . . . despite the odds, this area cannot be neglected." And he adds: "We are currently spending about 2 pct of our sales on engineering research and new-product development."

Divide Responsibility—In the technical center are focused the research and development staff and facilities. The central engineering staff takes responsibility for major product designs and improvements.

This might include redesign of the lawnmower division's power motors, or development of a new automotive accessory.

Once a design is refined and ready for release it's turned over to divisional engineering at the plant. They complete the production engineering and tooling stages. Any major changes that affect design factors are checked back with central engineering.

Advantages Are Many—Locating advanced design engineering far from plant operations might seem a serious handicap. On the contrary says P. G. Frerer, Director of Engineering, there are many advantages, few drawbacks.

He points out that when you have a modern technical facility like this, especially in a large engineering and production center such as Detroit, it's much easier to secure and hold top talent. On the other hand, if you try to set up complete development and engineering organizations in smaller cities you're bound to suffer talent-wise.

Then, too, gathering together advance engineering for varied products lends diversity, with different specialists complementing each other. For instance, Dura's technical center employs specialists, such as gear-train and electrical engineers, who are not concerned with any one product or project. With several decentralized engineering groups, you would be unable to afford that.

Saves Duplication—In a central facility, through maximum use, you can afford more expensive and sophisticated equipment. It's because you can avoid duplication of experimental and testing setups.

To cite an instance, several of the Dura's product divisions are vitally concerned with the sound level of their products. Adequate, top-grade sound measuring and recording equipment is expensive.

To install it in each division would be impractical. But the facility is economical for centralized engineering. Its use justifies the expenditure, saves overhead.

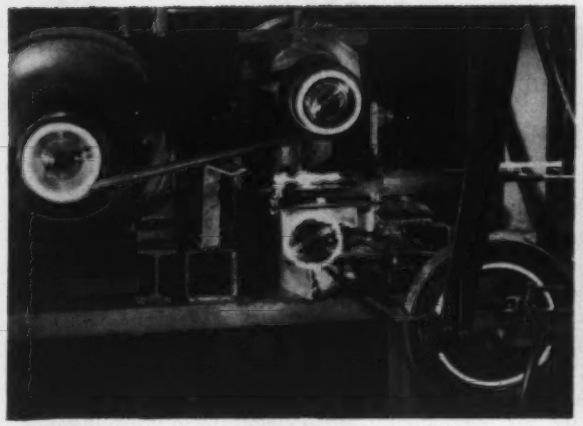
This same reasoning holds true for administration. The company believes you can afford better technical management. But other reasons top the savings in overhead.

Near Market Source—Engineering executives are now located for close access to top management, sales and marketing. Strategic location is important, especially to automotive supplier and agricultural implement divisions.

Being close to sales engineers and market analysis proves a real asset in product development. This location permits direct contact with the customer's engineering when technical problems arise. So they can do a better, faster job, especially in initial stages of development.

Mr. Frerer notes that a company must be flexible and able to move fast, keep ahead of the market to

DESIGN REVIEW: Advance project engineer and executive engineers give critical look at plans for a new product.



DRIVE TO FAILURE: How much abuse can the gear box of riding lawn mowers take? Unit (center circle) is repeatedly started by electric motor, driven at full speed and stopped until failure occurs.

TEST EFFICIENCY: Test engineer determines the efficiency of the electro-mechanical "muscle" that actuates an automotive seat adjuster. Two engineers add weight, while technician handles controls.

be successful in the rapidly changing supplier business. For instance, a customer may decide to switch to an electro-mechanical actuator from a hydraulic actuator on short notice.

Dura is a pioneer and a major supplier of both types. Being in close touch with such a change in product thinking gives them a head start on the new tangent.

Product Planning—Ideas for new products come from many sources: engineers, company employees, sales department, marketing, or directly from a customer as cited. But regardless of the source they must be reviewed by an appropriate executive committee to fit into the corporate policy.

The planning committee at Dura is composed of top executives from sales, manufacturing, finance, marketing and engineering. All are located in the Detroit center.

They review plans before new products or major product revisions are undertaken. Complete redesign of the power mower line, for instance, would be a major job. Basic engineering alone might run several hundred thousand dollars.

Product planning committee would review the program. They would determine if it was practical from a marketing viewpoint. Sales people would be queried to see if gains in anticipated sales would support the expenditure. Review would also cover pricing, important design features and other phases.

Preliminary Work—Engineering might be asked to make some preliminary studies for feasibility. This study would come back to the product planning group for a further review.

Now the product redesign program would have some body to it: advance designs for each line, proposals on costs and tentative time tables for scheduling.

The committee decisions would determine scope of the program, and the estimated engineering cost. As result of this discussion, engineering knowing management goals, can keep in close touch as product development unfolds.

Other Reasons—It proves helpful to separate product development and engineering design from plant operations for reasons other than cost and convenience. For one thing engineers are fairly well insulated from daily production problems.

If you try to handle development work alongside manufacturing engineering, it's difficult to make progress on the advance projects. The production crisis seems to take precedence; development work suffers. Complete separation allows steady forward progress.

Another gain is the cross-fertilization of ideas—always helpful in this field of new product development. The extent this exchange is used for idea generation would be virtually impossible without this type of organization.

Constructive Criticism — Whenever a new product idea reaches a suitable point, the key engineer prepares a formal presentation. This is staged before all other top engineering staff members. They sit as a critical group, but with a strictly constructive focus.

These early design reviews can do much to improve products. An engineer in automotive gearing may be able to suggest a better solution to a mower drive problem. But both project engineer and critic must approach the meeting in proper light. These meetings have proved very successful in improving product performance and reducing cost.

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Gage Blocks Gain Stability

Research Raises Standards For Space Age Needs

Gage blocks will soon be available for very high precision manufacturing.

Varied heat treatments control structural shrinkage and growth.

■ With the advent of the space age, there will be more demand for gage block accuracy of one part in a million. In fact, gages certified to 1 or 2 parts in 10 million must soon be available on a regular basis.

Steel gage blocks must have exact dimensions to monitor machined parts, such as machine tools, ball bearings and missile control mechanisms.

With this in mind, the National Bureau of Standards has been studying possible methods of increasing gage block stability. This is done by focussing its attention on the characteristics of materials.

Three types of gage blocks, produced by M. R. Meyerson of the Bureau's metallurgical laboratories, show greater dimensional stability than the best commercial types now on the market.

Less Shrinkage—The idea is to develop standards that will retain their calibrated lengths over long periods of time with less shrinkage or growth. Other requirements which cannot be neglected are: an appropriate coefficient of thermal expansion, surface finishes, parallelism of gaging surfaces, and resistance to wear and deformation.

What causes dimensional instability in gage blocks? It's the result of unstable structure formed during heat treating. Redistribution and relaxation of fabricated stresses result from incomplete hardening.

Fully annealed steel of low alloy content, at or near its equilibrium condition, should be free from further structural changes. However, such a block is too soft. An adequate surface finish cannot be applied, wear is high, and the surface is easily deformed. However, by adding a nitriding operation to the annealed steel, the bureau is improving these features.

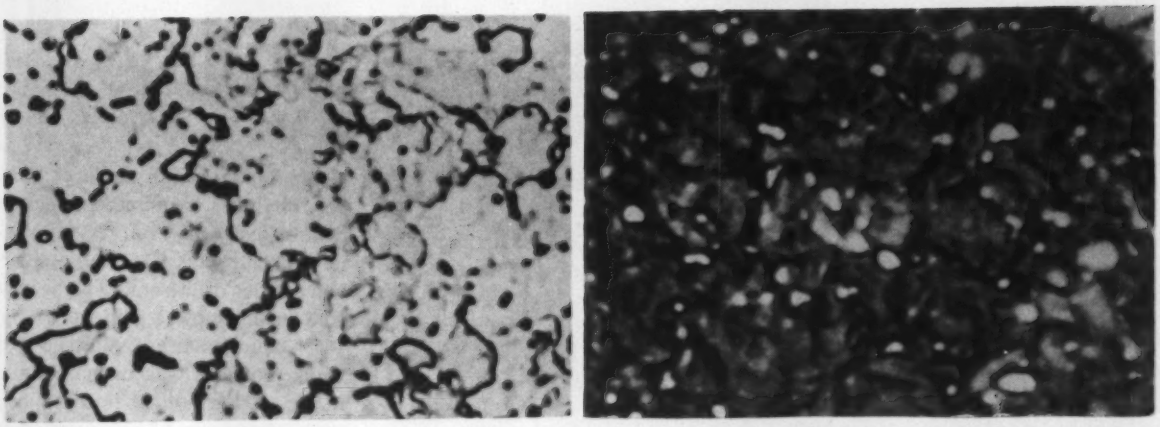
Sufficient data have been obtained on blocks of 410 stainless steel and 52100 modified steel to indicate that specialized heat treating can result in greatly improved stability. Annealed 410 stainless blocks, for example, with nitrided surfaces have been produced which exhibit a growth of only 0.0000002 in. per in. per year.

Also, 52100 steel blocks, given special stabilizing and stress relieving treatments, display a shrinkage of 0.0000004 in. per in. per year. At present, 16 materials are under investigation and have been given a total of 42 different treatments.

Precision Measurements — To evaluate the stability of gage blocks, T. R. Young and W. R. New of the Bureau employ two types of measurements—static and dynamic.

Static measurements are carried out by interference methods, while dynamic comparisons rely on a mechanical-electronic technique. Both

DIMENSIONAL CHECK: Mr. A. G. Strang of the Bureau uses light waves to determine possible changes in gage block lengths.



TREATED SURFACE: Nitrided 410 stainless steel (right) produces extremely good stability. A case of 0.005 in. is all that's needed. The photo-micrograph on the left is untreated 410 stainless.

are used to detect very small dimensional changes.

Until recently, very precise length measurements were generally done interferometrically. For such measurements, a Bureau-designed static comparator is used which meets present accuracy requirements. In this device a test standard is compared with steel gage blocks of established stability. Changes in cross-sectional dimensions are quickly and accurately recorded.

New Method — Comparisons of this type require that the two blocks be at thermal equilibrium. This is very time consuming, thus the more rapid technique of dynamic comparison is used.

With this method blocks are placed successively between mounted styli to compare their lengths.

Promising Results — Of the 16 materials under study at the Bureau, two types of 410 stainless steel blocks and 52100 modified steel, have been observed for a year.

The most stable blocks are the annealed 410 stainless steel. These are nitrided to a depth of 0.009 in. and ground to within 0.003 in. of finished length. They are then stress relieved in a cracked ammonia atmosphere, and finished by lapping the gaging surfaces. This process leaves a case of about 0.005 in.

The nitrided non-gaging surfaces, when left intact, have a frosty gray appearance. By grinding this layer, similar stability exists.

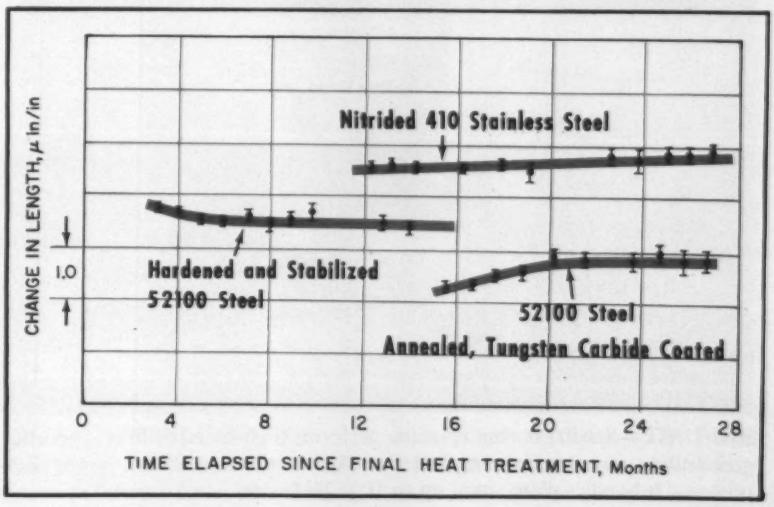
Through-hardened 52100 steel gage blocks were not quite as stable as the two nitrided 410 stainless types, but most of the dimensional change occurred during the first six months of observation. Further checks indicate the material gains stability with age.

A fourth block of 52100 steel, which has been under study for less than a year, shows great promise. It is annealed, then coated on the gaging surfaces to a depth of 0.004 in. with tungsten carbide. After surface grinding and lapping, about 0.0025 in. remained, providing a hard facing. Available data indicate that the overall growth of this block is 0.0000007 in. per in. per year. A substantial improvement in stability during recent months suggests that a much higher value may be obtained.

Recent Comparison—Several AA Grade commercial gage blocks were purchased from different manufacturers. They were then observed for stability in the same manner as the Bureau-developed blocks.

The commercial blocks became shorter, shrinking in a range from 0.0000007 to 0.0000019 in. per in. per year. The average is 0.0000011 in. per in. per year.

How Time Affects Gage Stability



Elephant Unit Speeds Drilling

Probably the largest boring unit to date, this special machine speeds its work with tape control positioning.

High-speed drilling, boring and gun drilling of heavy alloy plate are taken in stride.

By R. H. Eshelman
Machinery Editor

▪ Putting a large number of holes in heavy alloy plate is one thing. But doing it quickly and with exact precision is a very tough job. Ask any company in the atomic energy industry or anyone else making heat exchangers.

Fresh on the market is a special horizontal-boring unit that is designed to take advantage of the speed and precision offered in tape control. With it, much of the tedium and labor needed in drilling large alloy plate on a radial drill becomes a problem of the past.

You can, for example, put as many as 56,000 holes in a 10 x 10 ft work area. And speed? On common plate steels, you can drill ¾-in. holes up to 23 ipm. Faster drilling rates (40 ipm) can be obtained on leaded alloy plate.

BIG UNIT—Special boring machine performs high-speed drilling, jigboring, gun drilling, reaming, tapping and related operations on atomic power components. It handles plate stock up to 10 x 10 ft size.

Big Payoff—With the large number of holes required, numerical control really pays off, reports Walter P. Hill Inc., Detroit, designer and builder of the unit. This is even true on single-piece job lots.

Of course, one of industry's previous problems was in maintaining the exact location of holes. Variations did occur. Large size condensers (up to 10-ft square) are common. If the material were thin enough, tube sheets, supports and baffles could be stack drilled. But the thicker gages spelled drilling "one sheet at a time."

The new drill and table can handle up to 24-in. thick material, stacked for multiple drilling. Also, the machine avoids much part jockeying, and cuts down on setup time using a floating zero.

Duplicate Setups — This merely means you can change the starting reference point for the tape. Using this device it's simple to set up duplicate jobs, up to 5 ft maximum, side by side.

You can do both jobs with one setup, merely by shifting the tape zero. A further cost-cutting device is drilling, reaming and chamfering with the same tool.

Success of the unit depends on a number of design features. For instance, the spindle and machine head move vertically on twin columns. These, in turn, are supported by a cross beam that rests on two large table beams.

Thus the whole unit is tied together through the machine table in a strong box-type structure. This gives unusual rigidity and minimizes tool deflection in the work area.

Also, weights counterbalance the machine head. This allows easy movement combined with use of supplemental hydraulic power for positioning.

Simple Controls—The hydraulic control system furnishes most of the

forces for moving the machine head vertically or horizontally. Since this system uses counterbalanced hydraulic cylinders, it needs no servo valves.

The universal-type numerical control positioning system operates with only a ¾-hp motor. Standard punched tape is readily prepared by Flexowriter typewriter. It's simply programmed for spindle location and operation sequences.

A ball-bearing leadscrew moves the machine head and columns horizontally. Operating linkage to the numerical control positioning motor is a worm-gear speed reducer and a selsyn pickup. A hydraulic cylinder under pressure avoids backlash and furnishes booster power.

Hydraulic Helpers—This unusual arrangement operates as follows: To index the machine head under tape orders, the ¾-hp positioning motor begins turning. As this motion releases the leadscrew, the hydraulic cylinder is actuated and moves the spindle unit.

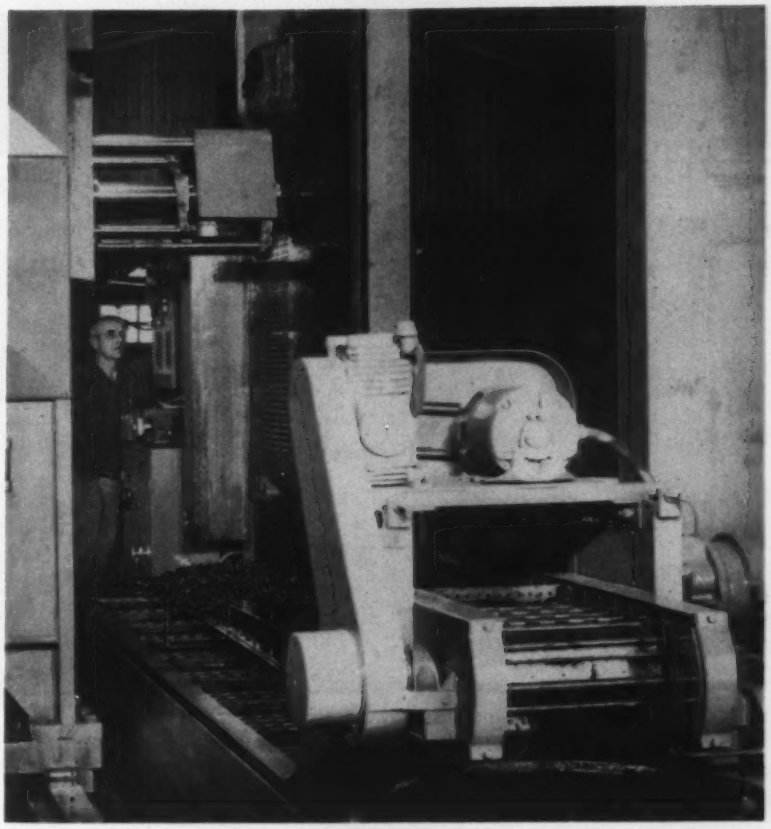
When the spindle is properly positioned, the motor shuts off, locking the leadscrew. The selsyn pickup unit checks the location. If correct, the operation sequence proceeds, the spindle advances for drilling. If wrong, the feedback system automatically corrects the error with further movement.

If the error cannot be corrected, as with incorrect instruction information, a light flashes on at the control panel. And the machine shuts off.

Simultaneous Motion—A similar indexing arrangement raises and lowers the spindle head, on the dual columns. When the machine seeks a hole position under orders of the tape, both horizontal and vertical motions take place simultaneously.

In total, three independent hydraulic systems are used in the machine. Besides the two for horizontal and vertical movement, there's a third for drill feed and auxiliary functions.

At present, this machine is working on Inconel class, high-tensile steels for nuclear reactors. Previous smaller machines also built by Hill of somewhat different design are in use in a number of plants on similar work of smaller scope. They run through the usual range of atomic alloys: Inconel, copper nickel and various stainless steels, as well as common plate steels.



CHIPS AWAY—Built-in motorized conveyor carries away heavy chip load produced by fast drilling. Cutting fluid is filtered and re-used.

Carbide for Gun Drilling—For larger holes, requiring gun drilling, the tools are usually carbide types. For most drilling, normal high-speed drills are used.

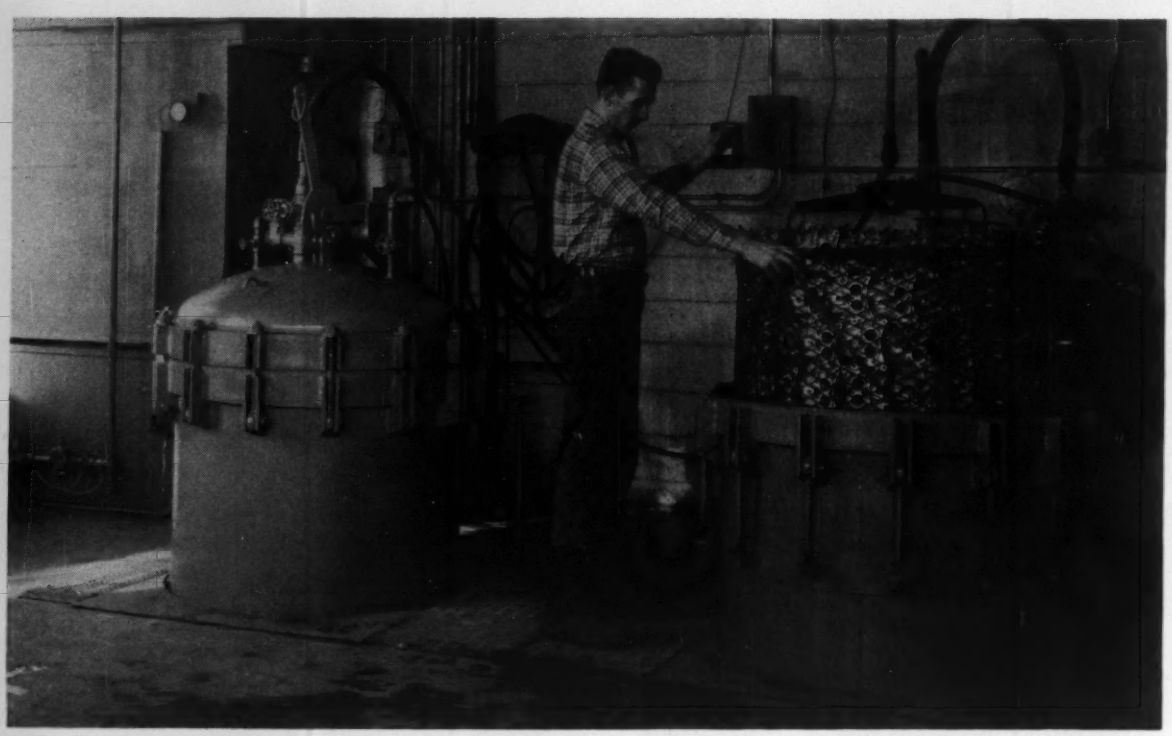
Other operations are also performed during the cycle, such as tap drill holes, ream and gun ream, chamfer and counterbore. With automatic programming the tape simply stops the machine and a light comes on when it's time for the operator to switch tools.

Even on these tough alloys, high precision results from the unitized construction. Linear spindle position accuracy is on the order of 0.0005 in.

Moves Chips—With much of this work, especially gun drilling and reaming, a flood of coolant is needed. This is furnished through the machine head direct to the point of the tool or through the gun tools.

Heavy flow of coolant also aids chip removal. Chips go back through the head and drop on a mechanized conveyor. This carries them off to the side of the machine. Coolant drains into a filtering and recirculating unit for re-use.

With large and heavy plates you merely lift the part into position against the vertical table beams by crane. Stacked sheet and smaller pieces are held differently. You can block or clamp them against knees or angle plates, or tie to auxiliary vertical supports.



FAST OPERATION: Operator lowers a basket of leaky castings into an autoclave. A double-autoclave setup achieves a processing rate of about 1050 parts-per-hour for the two-barrel carburetor design.

Impregnation Reclaims Castings

Carburetor production can be costly if there's no way to reclaim porous castings.

Impregnation serves as an auxiliary production process and reclaims 95 pct of all leakers.

■ Use of service impregnation—as an auxiliary-production process—continues to grow in popularity. A case in point is reprocessing of defective automotive-carburetor bodies.

Batch-type impregnation, performed by Prenco Products, Inc., Royal Oak, Mich., regularly saves more than 85 pct of scrap-product costs. Using a metal-oxide sealant, the company reclaims aluminum carburetor-body castings which have been rejected in production-line checks.

Each rejected casting is a known leaker. All leakers would have to be scrapped—were it not for the reclamation process. Impregnation, in this case, proves 95-pct effective. The fact that the castings are fully machined adds to total cost savings.

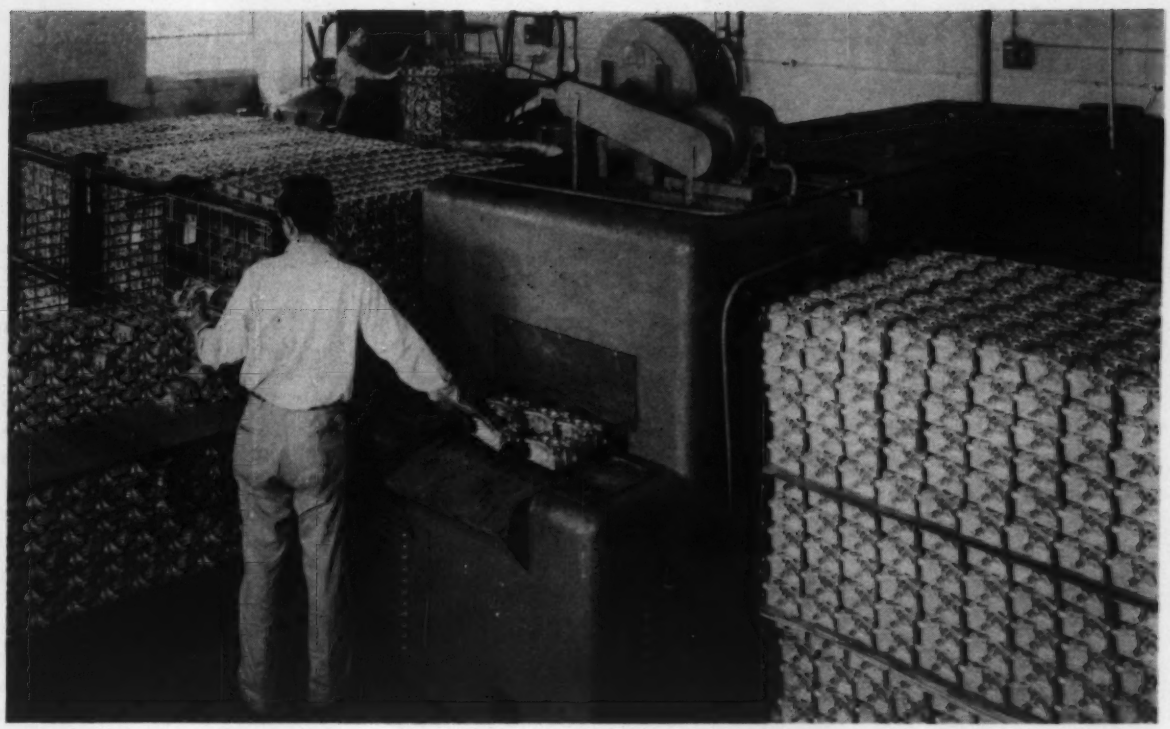
In addition to the impregnation cycle, the parts pass through a cold-water rinse, a hot-water rinse and blow-dry operations.

Compute Savings—Cost savings in any batch-type impregnation work are hard to pin down. The reported 85 pct is a minimum figure. Here's why.

This figure is arrived at by checking the value of the rejected castings—if they were sold as scrap on the open market—then deducting this amount from the manufacturer's costs at the production point of rejection. Burden and labor costs must, of course, be included. In the case of the carburetors, potential loss if scrapped equals 95 pct of the manufacturer's costs.

From this figure, the cost of the service - impregnation process—about 5 pct — must be deducted. Prenco achieves a 95-pct recovery. Therefore, final net savings amount to more than 85 pct of fabrication costs.

Cost savings actually are even greater. The foregoing method doesn't take into account the manufacturer's casting - production efficiency. In other words, it doesn't include the fact that if he scrapped leakers, he would have to make more castings to replace the rejects. And he would again face a high percentage of leakers in the new castings.



WASHER-DRYER UNIT: As castings emerge from the automatic washer-dryer, an operator inspects them for cleanliness. He stacks the reclaimed castings in the racks which belong to the automotive manufacturer.

Without impregnation, it takes 165 castings to get 100 sound ones.

Plug Leaks—Here's how Prenco processes the defective castings. Operators stack incoming parts, received from the automotive manufacturer, in special baskets. Then, they lower one of the baskets into an autoclave.

After the lid is securely clamped, a vacuum of 29.5 in. of hydrogen is drawn. The vacuum voids all casting pores.

Next, an operator introduces enough metal-oxide seal, at the correct temperature and consistency, to cover the batch. Air pressure of 100 psi is applied. Holding this pressure insures complete penetration of all casting pores.

Draining of excess sealant occurs after penetration is completed. The drained sealant returns to the holding tank for re-use with the next batch. Now the basket is ready for removal.

Dual Setup—Two autoclaves are used. While the operator loads and unloads one, the other works on vacuum and pressure phases of the impregnation cycle. A total rundown on impregnation-cycle time appears in the box.

Following removal of the basket from the autoclave, the batch enters a tank of cold water for a preliminary rinse. The basket unloads onto a three-stage, washer-dryer unit.

Castings pass through the washer-dryer on a continuous conveyor. First they encounter a cold-water-spray rinse. A hot-water-spray rinse follows as the second cycle. In the third cycle the parts are blown dry. They emerge clean and dry at the opposite end of the washer-dryer unit.

An operator takes them from the conveyor, inspects them for cleanliness and stacks them in the racks belonging to the manufacturer. Prenco processes carburetor-body castings at rates of about 720 per hour for the four-barrel design and 1050 per hour for the two-barrel design.

Here's Impregnation-Cycle Rundown

	Minutes
Load Autoclave	1.5
Draw Vacuum	10.0
Introduce Sealant	3.0
Apply Pressure	10.0
Drain Sealant	3.0
Unload Autoclave	1.5
Total Cycle Time	29.0

Precision Big-Press Forgings Cut Down Chip Machining

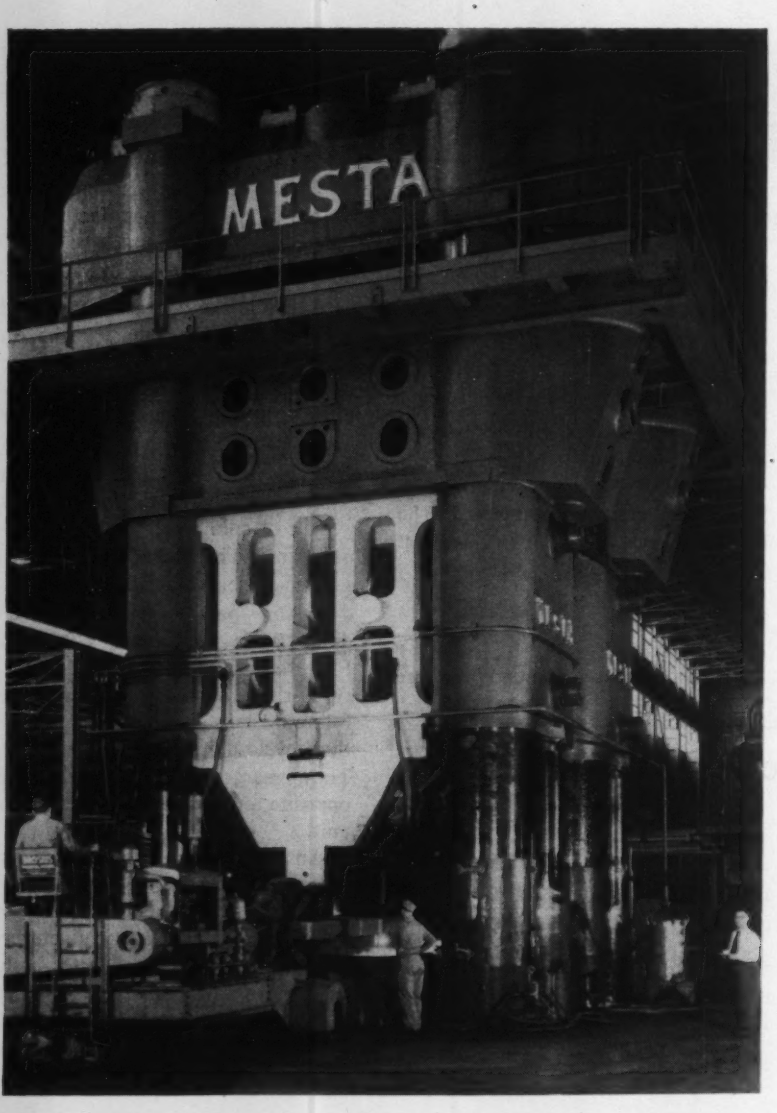
By A. E. Favre—Asst. Forge Plant Manager, U. S. Air Force Heavy Press Plant,* Cleveland

Why pour money into costly chip removal when a big-press forging can save two ways?

A single high-pressure forging precludes over 1000 lb of chips—prior to shipment.

■ Precision big-press forgings offer a challenge to conventional and block designs. Here's a case in point.

A 1400-lb hand forging isn't easy to handle. And a lot of metal must be removed to meet an assembly weight of 230 lb. Naturally, machining 1170 lb of chips takes time and costs money.



Ship Waste—The mass of chips represents metal that was paid for but not used. In addition, the chips account for almost 85 pct of the forging's shipping weight and handling costs.

Replacing the hand forging with a block-type design, made on a 15,000-ton press, saves both time and money. Each block forging weighs 645 lb. This is less than half of the weight of a hand forging.

To meet the 230-lb assembly weight, 415 lb of chips must come off every block forging. However, a major part (755 lb) of the chip-removal problem disappears. But the assembly weight still represents only a fraction of the forging's shipping weight.

High Pressures—Giant hydraulic presses, operated by Alcoa for the U. S. Air Force, make a real dent in the chip-removal problem. A single big-press forging does away with more than 1000 lb of costly chip machining for each part.

Using a 35,000- or 50,000-ton hydraulic press, Alcoa forges each part to a total weight of 290 lb. Only 60 lb of chips must be removed from these precision forgings to meet the assembly weight. This represents a savings of 1110 lb of machining chips per part.

The foregoing example shows

GIANT PRESS: A 50,000-ton hydraulic press produces precision forgings. A big-press forging precludes more than 1000 lb of costly chip machining in the preparation of an aircraft landing-gear bulkhead.

*Operated by the Aluminum Co. of America

that transition from conventional to precision forgings is already successfully taking place. But new problems have cropped up.

Space Problems—Major cutbacks continue to take place in the field of jet-powered, manned aircraft. As a result, more attention is being given to the design of missiles and rockets.

Overall and component designs for missiles and rockets differ greatly from those for manned aircraft. Therefore, materials that meet high-temperature service must be used. And part sizes are such that large forgings presses become a must.

Recently, Alcoa and the Brush Beryllium Co., Cleveland, produced a large beryllium forging on the 50,000-ton press. This disc-shaped part has an 85-in. OD, a 2¾ in. wall thickness and an inside cup depth of 11 in. Ultrasonic tests show no flaws in this vital part.

In addition to the beryllium part, the giant press forges steel blanks 65½ in. in diameter and 1½-in. thick. These forgings serve as fuel tanks for missiles.

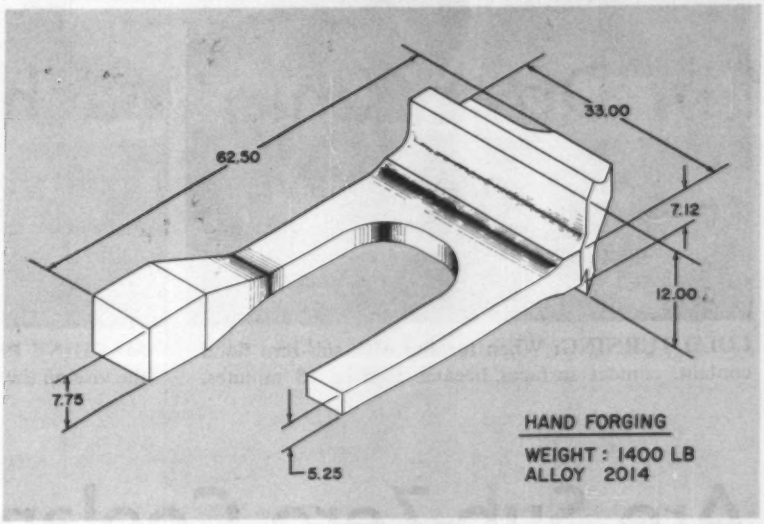
Good Designs—Both of the giant presses have large bed areas. Each provides four high-pressure stages. And each press has eight hydraulic cylinders.

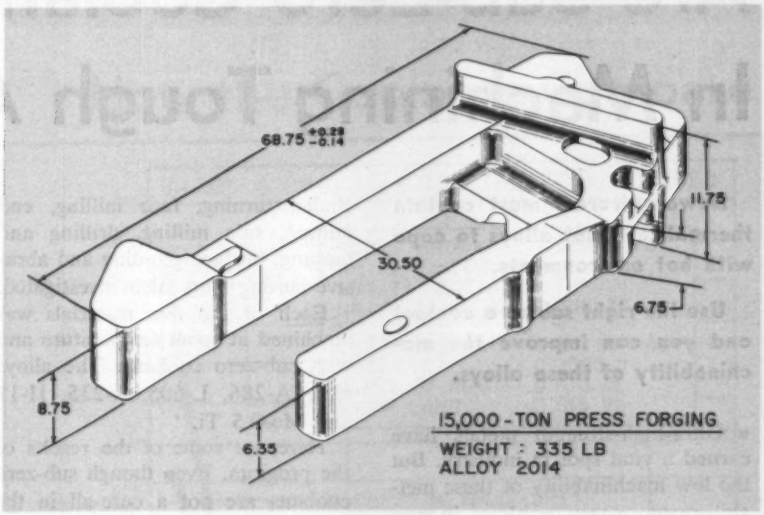
Die-holder and hard-plate setups on the presses insure uniform loading. These setups allow either press to be used with dies to produce steel forgings or to make parts from exotic or refractory materials. If the length of a part requires a great deal of height—for removal from the press—dies can be designed to forge with the hard plates or even with the holder removed.

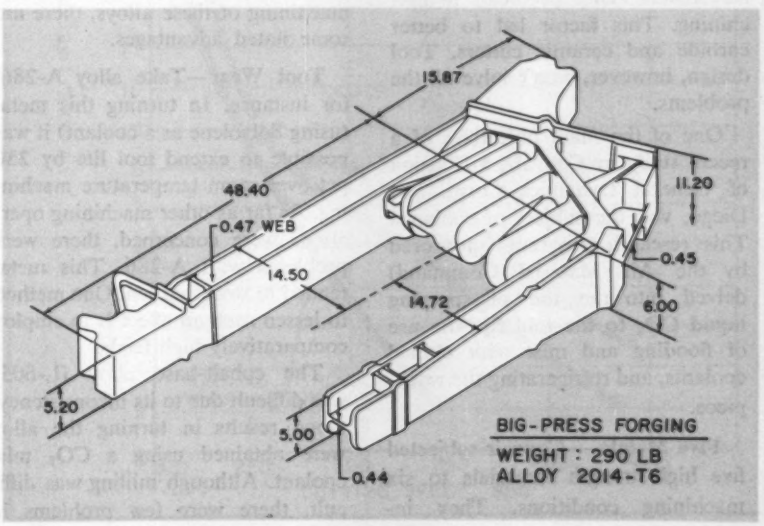
Proper load distribution even allows dies to be mounted on the platen of the press. Each press has a die table that slides out with the bottom dies intact. This speeds ejection of long parts.

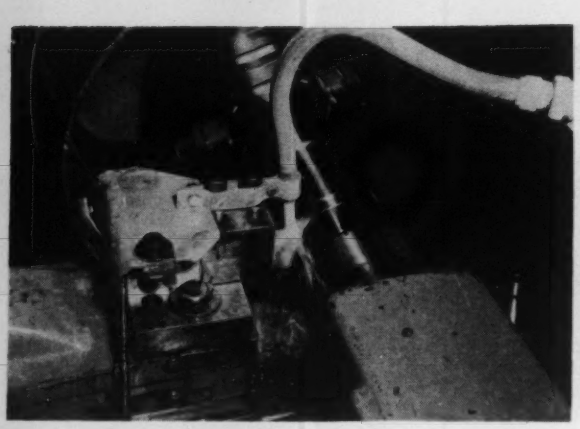
Hard plates and dies are interchangeable between the two presses. This increases the effective operating time for both units.

Compare Forged Weights

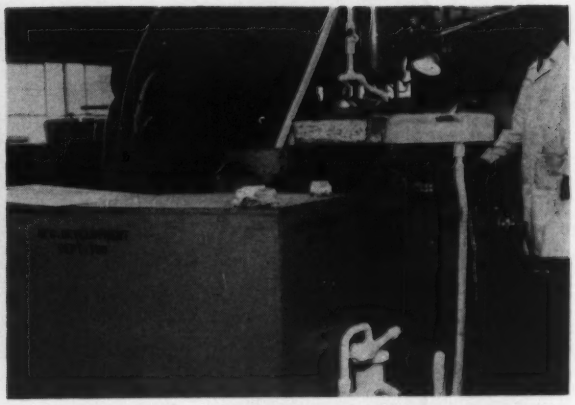








COLD TURNING: When turning with sub-zero flood coolant, contact surfaces became iced in 15 minutes.



MACHINE PROTECTION: A pan for coolant under the vise on the machine table acts as a protective device.

Are Sub-Zero Coolants Useful In Machining Tough Alloys?

Newer aircraft must contain thermal-resistant alloys to cope with hot environments.

Use the right sub-zero coolant and you can improve the machinability of these alloys.

▪ Ultra-high-strength metals have earned a vital spot in industry. But the low machinability of these metals creates many problems in machining. This factor led to better carbide and ceramic cutters. Tool design, however, won't solve all the problems.

One of the main objectives of a recent study by Convair, a Division of General Dynamics Corp., San Diego, was the subject of coolants. This research program (sponsored by the Air Material Command) delved into the use of spraying liquid CO_2 to the tool tip, the use of flooding and mist with chilled coolants, and refrigerating the workpiece.

Five Metals — Convair subjected five high-strength materials to six machining conditions. They included turning, face milling, end milling, side milling, drilling and tapping. Surface grinding and abrasive cutting were also investigated.

Each of the five materials was machined at room temperature and with sub-zero coolants. The alloys were A-286, L-605, R-235, H-11 and Mo-0.5 Ti.

Here are some of the results of the program. Even though sub-zero coolants are not a cure-all in the machining of these alloys, there are some noted advantages.

Tool Wear—Take alloy A-286, for instance. In turning this metal (using Solvolene as a coolant) it was possible to extend tool life by 250 pct over room temperature machining. As far as other machining operations were concerned, there were problems with A-286. This metal tended to work harden. One method to lessen such an effect is to employ comparatively high feeds.

The cobalt-base alloy (L-605) was difficult due to its inconsistency. Good results in turning the alloy were obtained using a CO_2 mist coolant. Although milling was difficult, there were few problems in drilling the tough alloy. Solvolene, a trichlorethylene-type coolant, helped increase tool life by 200 pct.

Little Success — The nickel-base alloy (R-235) showed the poorest response of all. The grain size and structure of the metal just weren't consistent. Despite these obstacles, tool life was increased in two of the operations (end milling and drilling) by 100 pct. In the former, CO_2 was used, while Solvolene was the coolant used for drilling.

An increase in tool life of 230 pct was obtained in turning test bars of H-11 alloy. And CO_2 mist was the coolant. But the alloy was so hard (Rc 51) that end and side milling tests with high speed steel tools weren't even attempted.

Of the five alloys tested, Mo-0.5 Ti displayed the most uniform machining traits. A CO_2 mist improved tool wear by 100 pct in the turning sequence. The most noted improvement was in drilling the alloy. Here, there was an increase of 400 pct. The coolant? Solvolene.

Thermal Shock — The biggest problem in milling these alloys

seemed to be due to thermal shock and severe buildup on the cutting edges.

Whether coolant is used or not, high-strength alloys can't be machined with any degree of success unless the chip-tool-interface temperatures are very closely controlled.

Convair engineers felt that there was some relationship between machinability and the variation in structure and grain size from bar to bar.

Proper Setup—Before any machine goes to work on any of these alloys, it must be set up just right. Spindle bearings and gibs must be tight. Ways must be smooth. And cross slides should be free from backlash.

Don't vary too much from specified geometry when you recondition your cutting tools. In most cases, high - abrasion heat - resistant tools are better than the more common moly steels.

Wear Lands—In general, the tests showed that wear lands of more than 0.010 to 0.015 in. caused rapid work hardening of the machined surface. It also increased the danger of cutter breakage. Infinite machine-speed selection is required to obtain optimum cutting conditions.

Do the sub-zero temperatures seem to have any effect on the metals themselves? Not as far as mechanical properties and microstructure are concerned.

The Coolants — The coolants, both Solvolene and CO_2, have no toxic effect on workers, although the trichlorethylene fumes in Solvolene at room temperature can be slightly annoying.

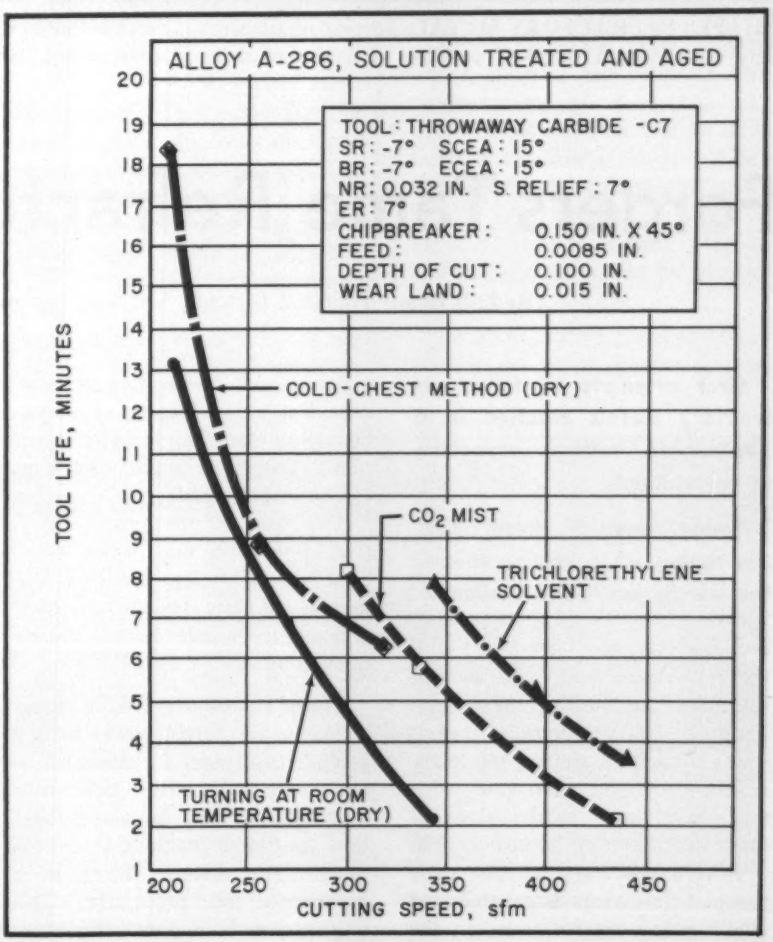
CO_2 has no effect on machines. Solvolene, on the other hand, does have a degreasing effect on all contact surfaces. Since that's the case, it's best to oil or grease such areas from time to time to prevent rust from forming.

To bring Solvolene coolant down to sub-zero temperature, CO_2 is added.

What the Alloys Contain

Alloying Elements	A-286	L-605	R-235	H-11	Mo-0.5 pct Ti
C, pct	0.08 max	0.15 max	0.16 max	0.37–0.43	
Mn	1.0–2.0	1.0–2.0	1.0 max	0.20–0.40	
Si	1.0 max	1.0 max	1.0 max	0.8–1.0	
Cr	13.5–16.0	19.0–21.0	14.0–17.0	4.75–5.25	
Ni	24.0–27.0	9.0–11.0	88.0		
Mo	1.0–1.5		4.5–6.5	1.2–1.4	99.5
Fe	Balance	3.0 max	9.0–11.0	Balance	
Co		Balance	2.5 max		
Ti	1.75–2.25		2.25–2.75		0.5
V	0.1–0.5			0.4–0.6	
Al	0.35 max		1.75–2.25		
W	14.0–16.0				
S	0.04 max			0.03 max	
P	0.04 max			0.03 max	

How the Coolants Compare



SHAPES REFRACTORY METAL: Forging of almost any molybdenum shape is possible. Purpose of the suction fan is to prevent the discomforting fumes of molybdenum trioxide from bothering workers.

Forgers Tame Refractory Metals

By **J. J. Russ**—Technical Director, The Steel Improvement & Forge Company, Cleveland

First attempts to forge refractory metals resulted in a number of problems—cracking in particular.

Today, many of these alloys are being successfully shaped for use in the missile industry.

■ When designers were faced with the problem several years ago of selecting materials for missile applications, they naturally looked towards the high melting refractory metals. But how does one forge parts from these metals? Many of them were found to be unworkable.

It is a problem that has made the past few years interesting and challenging ones for those in the materials end of the forging business. Yet, today, forgings of molybdenum and tantalum are production items. Shapes of almost any kind can be readily made.

The photo on the opposite page (top) points up one of the common shapes being used by the missile industry. The picture is of a first stage nozzle for the Polaris missile.

Flows Sideways — What is involved in the forging of refractory metals? One point to remember is that these metals, particularly molybdenum and tantalum, have flow traits like titanium or columbium. The material flows in a preferential side movement. This means that it is much easier to make a simple upset component than it is to back extrude to fill the die cavities.

Tungsten is one exception. It is not only hard to forge in a simple pancake or sideways approach, but we have also been unable to repetitively produce simple cavity shapes.

It has been shown, in practice, that unlike steel, aluminum, magnesium, and zirconium, the body centered refractory metals must be forged at higher impact velocities to start metal movement. Once the plastic flow starts, it must be kept moving to complete the forging.

Some Residual Stress—Theoretically, optimum properties are obtained in the refractory metal series

when a fairly high level of residual cold work remains in the forging.

Yet, this factor is not always controllable. It may have some deleterious aspects. For example, too high a degree of residual stress gives rise to cracking during machining. Too low a residual amount of cold work causes the forging to be brittle. Aggravating assembly problems result.

Consider the forging of the Polaris first stage nozzle as shown in the first photo. Physical property testing in the wide expanded section of this particular forging reveals some rather interesting facts.

The forging shows excellent ductility and good grain structure when a lot of residual cold work remains. As we move down to the smaller-diameter, thicker-wall portion of the forging, we find that the ductility starts to decrease to 2-5 pct—and possibly zero pct. Why? At the bottom or throat portion of this liner, there is relatively minor amounts of working.

Needs Little Heat—Working of tantalum is a challenging job. In the pure form, it is very ductile. In fact, it can be worked at or just slightly above room temperature. At 300°-400°F, good flow and little or no contamination result.

But when we alloy the material with 10 pct tungsten, the working range jumps to 2400°-2800°F.

FOR HIGH TEMPERATURES: Typical molybdenum forging serves as a first stage nozzle for Polaris missile.

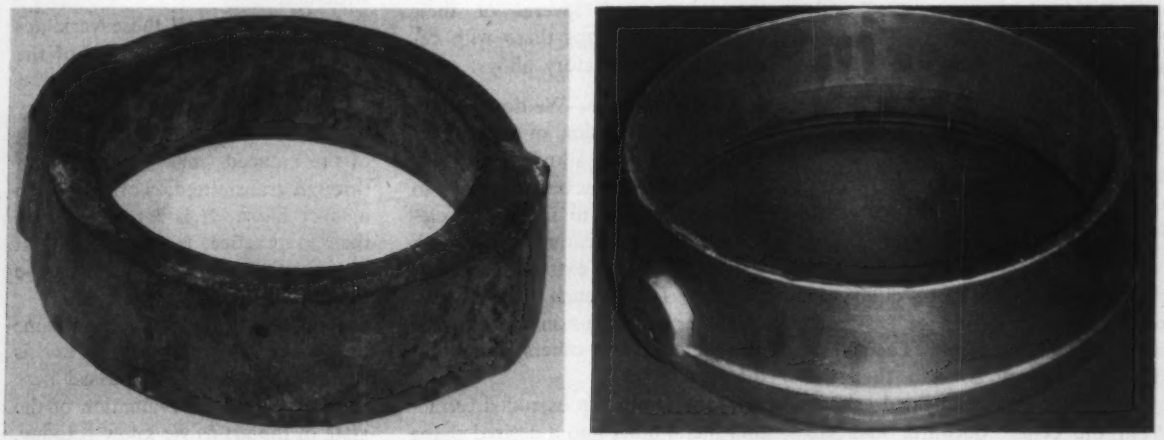
Adding more tungsten raises the working range even higher — to 3300°-3400°F.

This brings up another problem. Most of the refractory pure metals are "getters." This means that they act as sponges, absorbing gases such as nitrogen, oxygen, hydrogen. Carbon can also be absorbed.

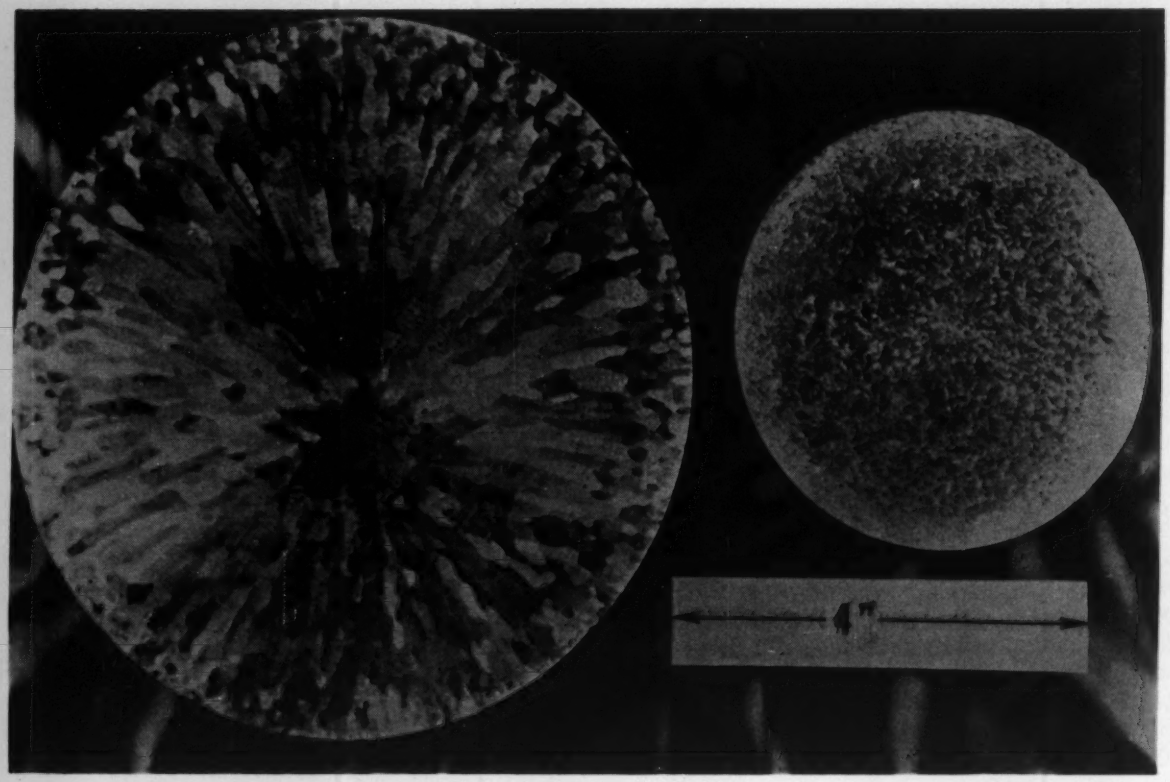
Tantalum and columbium are two of the worst offenders. Molybdenum and tungsten, fortunately, have a very sluggish diffusion rate; the penetration depth is not too significant. In all cases, normal machining results in good product cleanup.

Several Possible Ways — What about material fabricability? Molybdenum and its alloys containing up to 30 pct tungsten, can be satisfactorily electron beam melted into ingots up to 6 in. diam. To attain a 7 in. diam product, the alloy is arc cast. Larger diameters up to 8¾ in. can be made by powder metallurgy techniques.

As alloy content shifts to higher percentages of tungsten and less



EXPERIENCE TELLS: Forging of refractory metal (left) was made by crude techniques when job was first attempted. Method now used by experienced forgers to make same part is obviously preferred.



NO TEARS: Molybdenum shape (right) shows no tears after extrusion from as-cast structure (left).

molybdenum, forging problems arise. The alloys can be furnished in the arc cast or electron beam melted condition. But, neither the forge shops nor the extruding houses have been successful in the further direct conversion of the ingot to usable products. Fortunately, shapes produced by powder metallurgy techniques have been forged.

This situation reverses itself with tantalum-tungsten alloys. The only successful materials which we have had for forging have been made by electron beam melting or vacuum arc casting. As-sintered products are not forgeable. In most cases, they cannot be cold-pressed and sintered.

Reveal Coarse Grains — The photograph on this page points up why direct conversion of "as-cast" molybdenum is difficult. The solidification product is such that the grains have an elongated shape from the center outward, and are quite coarse.

The boundry area between the columnar grains is very weak. Impact forces such as developed in a hammer or mechanical press result in separation at these areas. A slow acting press does a fairly good job up to a point. But it cannot work the metal enough before both internal and external rupturing occur.

Successful extrusions have been made from molybdenum, tantalum, columbium and several of their alloys. But it stops there with respect to the refractory alloys.

Poses Problems—We do not fully know why extrusion of the higher level of tungsten alloys is so difficult. Reasons may be: resistance to deformation due to interstitial elements; limits in heating; not enough power in current extrusion presses.

Surely, factors such as lubricants, die materials, extrusion speeds, rates of reduction and others also enter the picture.

Transforming an extruded refractory metal billet into a desired shape presents other problems. These arise from the odd behavior of the pure metal as well as resistance to plastic deformation.

Other Factors Arise—There are also processing variables common to these metals which must be controlled in practice. They may affect brittleness, anisotropy in mechanical properties, variation in recrystallization traits and uniformity of structure.

Ability to control these variables will indicate the useful level of the forged product.

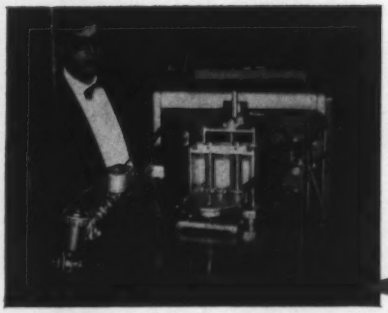
It is typical of the refractory metals that the stress distribution of the induced work forces are not through transmitted; working is on a layer basis. It is for this reason that, in practice, a definite amount of reduction is spelled out for the fabrication of any component.

Are there any other problems that need solving? The answer is yes. What we have discussed here represents only an evaluation of the state of the art as we know it today. It's expected that the future will bring more answers.

Called for Sperry Ultrasonics

At Chrysler Corporation, Sperry collaborated with methods researchers to develop an improved ultrasonic inspection system. The new system, named SIMAC (Sonic Inspection Measurement and Control), automatically tests sheet steel for internal flaws in excess of 400 feet a minute. Flaws are marked by dye and the faulty steel rejected before it reaches the stamping phase. The resultant quality control assures the most perfect product with the least waste of man hours and material.

Should your blueprint for quality require ultrasonics, X-ray or magnetic particle testing, call on Sperry. We are fully prepared to evaluate your quality control problem and help you choose the most efficient nondestructive test system.



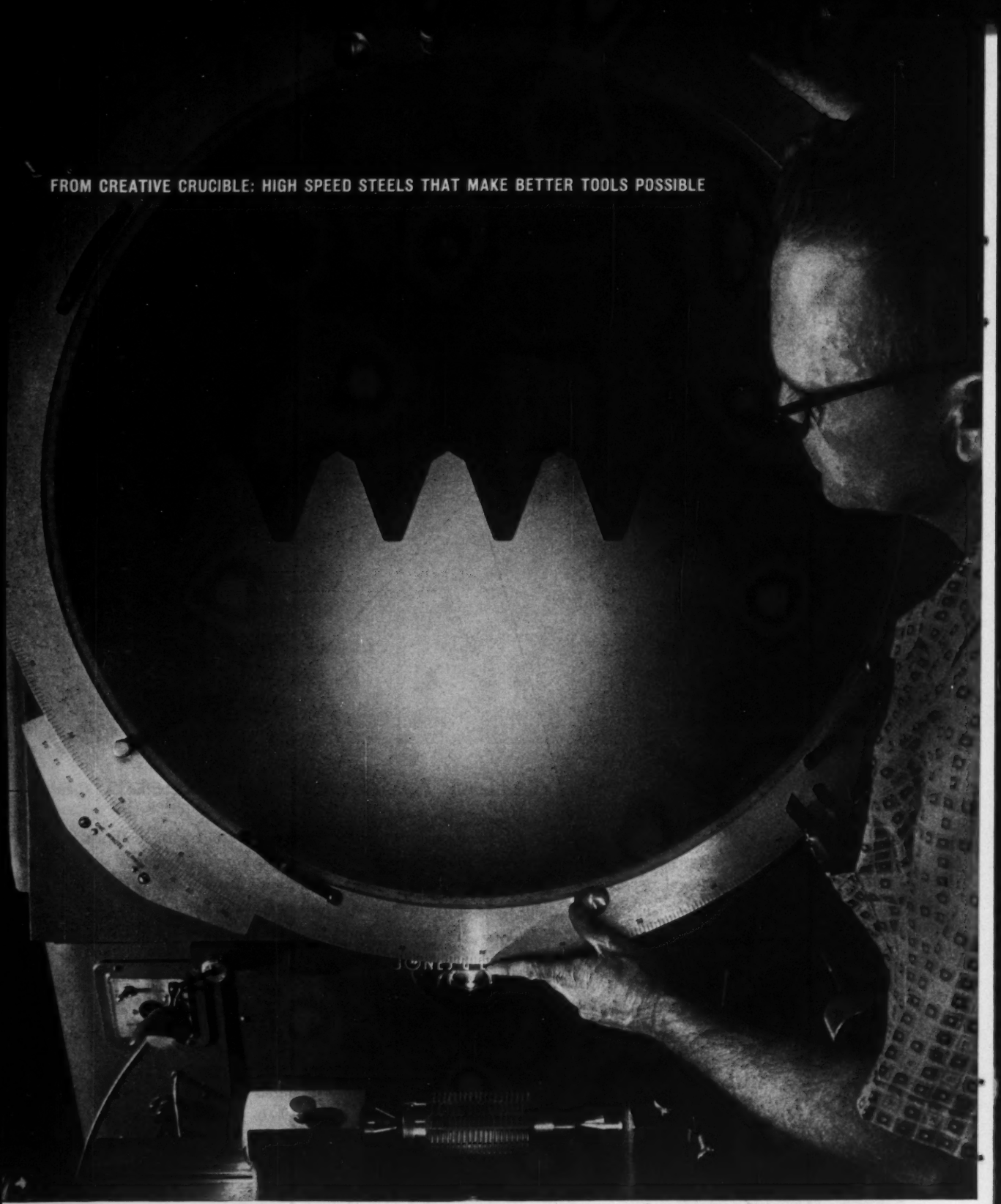
Defective sheet steel is automatically sprayed with dye on the production line at Chrysler's Nine Mile Stamping Plant.

Sperry Products Company

DIVISION OF HOWE SOUND COMPANY

306 SHELTER ROCK ROAD, DANBURY, CONNECTICUT

FROM CREATIVE CRUCIBLE: HIGH SPEED STEELS THAT MAKE BETTER TOOLS POSSIBLE



UNGROUND CLASS "C" HOBS, *made from Crucible's M2S, consistently meet runout tolerances as required.*

ACCURATE HOBS— WITHOUT GRINDING!

Toolmakers hold hob tolerances to less than 0.001" without finish grinding—because of improved manufacturing skills and continually improved Rex® High Speed Steels.

Today's toolmakers are not only producing accurate unground hobs to closer tolerances – they're also making them stronger, longer-lasting and with fewer grinding stresses.

What is behind this development? It's the skill of the toolmakers – combined with continuing Crucible developments that improve the quality of Rex High Speed Steels. Crucible tool steel metallurgists, working closely with producers of fine precision tools, are able to devise mill manufacturing practices to provide steels ideally suited to specific applications.

At Crucible, Rex High Speed Steels have always been produced under the close personal supervision of the most experienced men in the industry. Today, these men utilize the most advanced electronic instrumentation to assure the production of highest quality steels. For example, they use precision instruments to control the temperature of the molten metal, in the melting furnace, so each heat is produced under identical conditions. New techniques permit greatly improved deoxidation of the liquid steel. New ingot mold designs provide freedom from segregation when the steel solidifies. And all Rex High Speed Steel billets are inspected ultrasonically before they are rolled or forged.

As a result, Rex High Speed Steels continue to make the best hobs because they offer:

more uniform distribution of carbides throughout the section. This ensures minimum size change, greater predictability in heat treatment, greater hardenability and more uniform hardness in the heat-treated tool:

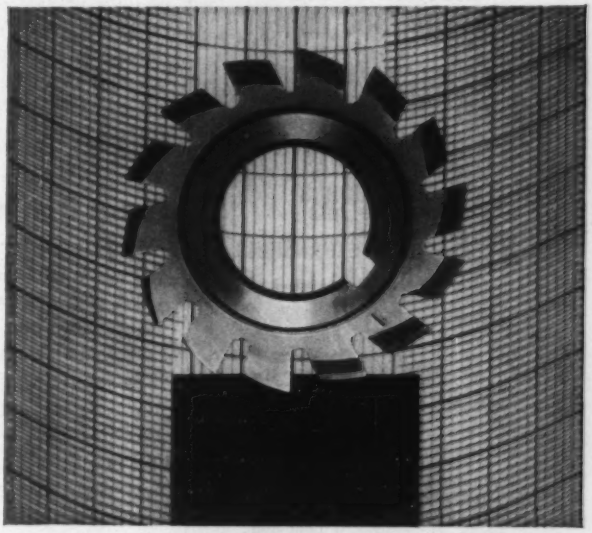
more uniform distribution of sulfides in the free-machining grades. And this provides improved machinability and superior surface finish.

Single-Thread Gear-Hob Tolerances (in Ten Thousandths of an Inch)

	DIAMETRAL PITCH										
	1 Thru 1.999	2 Thru 2.999	3 Thru 3.999	4 Thru 4.999	5 Thru 5.999	6 Thru 8.999	9 Thru 12.999	13 Thru 19.999	20 Thru 29.999	30 Thru 50.999	51 and Finer
RUNOUT											
Outside Dia. C	50	45	40	25	20	17	17	12	12	10	8

Table: Metal Cutting Tool Handbook

FINAL PROOF OF A HOB'S ACCURACY. *This lead variation chart, produced by a special electronic recorder, provides a check of every tooth in the hob. Checks are made "against perfection" — so, any deviation shows up on the chart. Photomicrograph shows tooth area's structure and the uniform distribution of carbides in Crucible Rex M2S. (Photo: 100X dia.)*



BETTER TOOLS, THROUGH BETTER STEELS. *The constant improvement of Rex High Speed Steels ensures the increasingly greater performance of fine twist drills, taps, broaches and cutters — as well as hobs.*

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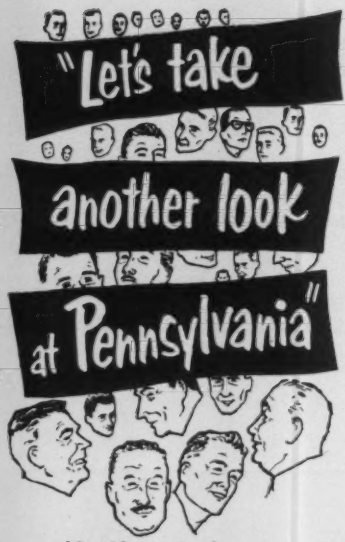

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New Patents In Metalworking

Gas Control

Flue-gas distribution in heating furnaces, W. H. Dailey, Jr. (assigned to Midland-Ross Corp., Cleveland, O.), Mar. 22, 1960. Method and apparatus for controlling combustion gas, or flue-gas, in slab heating furnaces. This method overcomes the tendency of the gases to flow from one side of the stock line to the other before reaching the flue area, and thus avoids "washing" of the slabs. No. 2,929,615.

Sheet Rolling

Apparatus for making flattened, elongated metallic bodies with finished edges, from powdered metal. W. A. Reed and R. A. Holman (assigned to Republic Steel Corp., Cleveland), Apr. 19, 1960. Apparatus rolls powdered metal directly into strip or sheet form in a single roll pass; it also forms finished edge portions thereon, by providing a moving surface in contact with the edge of the powder as it passes between the principal rolls. No. 2,-933,305.

Concentrates Ores

Apparatus for concentrating ores, N. H. A. Rodman (assigned to Oreclone Concentrating Corp., New York), Mar. 29, 1960. In the upgrading of siliceous-iron-oxide ores, the ore is passed onto an endless, inclined conveyor; it is provided with riffles only part-way across, laterally. A stream of water is fed to the belt to wash the silica tailing over to the unriffled side, while the mineral particles are retained by the riffles. No. 2,930,484.

Property Improvement

High-temperature alloy steel with improved room temperature properties, W. R. Kegerise and G. B. Heydt (assigned to The Carpenter Steel Co., Reading, Pa.), Apr. 12, 1960. An age-hardenable steel alloy comprises up to 0.15-pct C, up to 1 pct each of Si and Mn, 9-16 pct Cr, 4.5-5.35 pct Mo or W, 0.6-4.5 pct Cu, and the remainder substantially all Fe. The Cu may be replaced or supplemented by 1-9 pct Co. The resulting age-hardened steel has good corrosion resistance and stress rupture life at elevated temperatures, and good ductility and strength at room temperature. No. 2,932,568.

"Patent Review" apears in the third issue of The IRON AGE each month. Look for it in the June 16 issue.

High Bond

Method and pack for making zirconium-clad steel plate, T. T. Watson (assigned to Lukens Steel Co., Coatesville, Pa.), Apr. 19, 1960. This method produces zirconium-clad steel plate, in which the shear strength of the bond is extremely high. No. 2,932,885.

Improves Soldering

Solderability of tin plate, U. T. Hill (assigned to Inland Steel Co., Chicago), Apr. 5, 1960. To improve the solderability characteristic of

differentially-coated tin plate, the fusion-heated sheet is contacted briefly with dilute hydrofluoric acid to remove residual silicates. No. 2,931,759.

Increases Efficiency

Electrically-operated, stove-changing-control apparatus for blast furnaces, W. Braun, H. Jansen and B. Scholl (assigned to Zimmerman & Jansen G.m.b.H., Duren, Rhineland, Germany), Apr. 5, 1960. A stove - changing - valve control, for hot blast stoves, increases the efficiency of the operation and provides greater safety for the stove operator. No. 2,931,635.

Grain Refinement

Method of grain refining centrifugal castings, M. L. Samuels (assigned to United States Pipe & Foundry Co., Birmingham), Apr. 5, 1960. In a method for refining the grain structure of tubular castings of ductile metal, such as austenitic steel, the cast tube is expanded by uniform-radial-interior pressure, heated while expanded, and then quenched. No. 2,931,744.

Rust-Proofing

Method of sintering and nitriding ferrous bodies, L. Pessel (assigned to Radio Corp. of America, a corp. of Del.), Apr. 19, 1960. A method which simultaneously sinters and nitrides compressed bodies of soft-iron powder, whereby the resulting articles are rendered rust-proof. No. 2,933,386.

Defect Detector

Apparatus for detecting and recording defects in a strip, E. S. Lawrence and E. R. Muddiman (assigned to U. S. Steel Corp., Pittsburgh), Mar. 29, 1960. Apparatus detects defects, and records the position and type of imperfection in long lengths of coated or uncoated steel strip. No. 2,930,228.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

PRECISION PRODUCTION PROBLEMS?

Here's help from Bausch & Lomb in TOOL DESIGN, INSPECTION, FABRICATION, MEASURING, TESTING

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Quickly measures transparent or opaque objects of any contour. Linear, accurate to 0.0001"; angular, to 1 minute of arc.

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Positions small parts for critical measurement with B&L Bench Comparator and Toolmakers' Microscope. Auxiliary base, with 7" travel, increases range beyond that of measuring stage.

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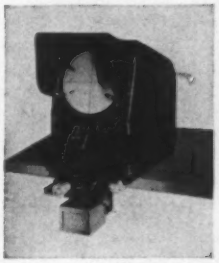

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Exclusive under-stage illumination—no complex set-ups, no holding fixtures for most work. Magnified silhouettes, show errors instantly. Reads to 0.0001" with optional micrometer stage.

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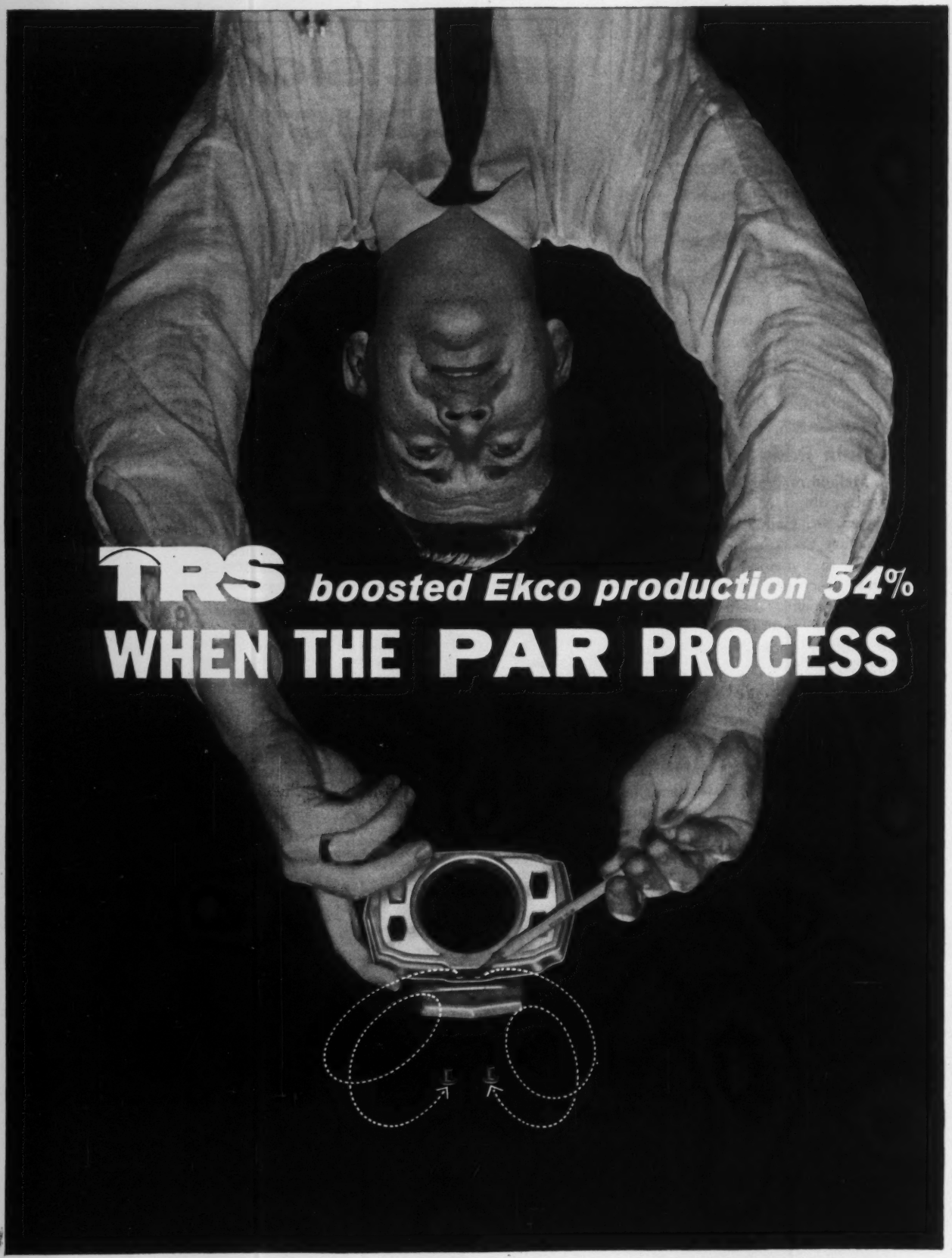
TRS boosted Ekco production 54%
WHEN THE PAR PROCESS

For Ekco Products Company, attaching wall brackets to their Autoyre® soap dishes and glass holders meant hand-assembling components with solid aluminum rivets in position, then placing the assembly in a die which required two strokes to clinch the rivets. This slow process, with lots of hand work, became a serious handicap when production demand started to climb. Obviously, a better method had to be found.

Automatic riveting, with semi-tubular rivets, would offer real savings. But riveting from the front was blocked by a flange on the product, and riveting from the back left the rivet clinches visible which lessened the attractiveness of the finished product.

There the problem stuck, until the TRS engineer — applying the PAR Process — suggested a new viewpoint. Working with Ekco engineers, he proposed riveting the assembly from the back but with the rivets fed upside down, so that their heads would be visible as required for good appearance. To accomplish this, he designed a special flat head rivet which could be fed and set in this manner with a standard TRS machine.

The change jumped daily production volume by 54%, without loss of product quality or appearance values.

THE MACHINE PAR PROCESS PRESCRIBED was a standard TRS Model 103I single-drive riveter. Designed to set flat head rivets of the type used in Ekco glass holders and soap dishes, it feeds them into the riveting position resting on their heads. For Ekco, the machine was fitted with a special loading fixture to position the parts of the assembly, and an air-operated pusher to eject the finished units.

STOOD RIVETS ON THEIR HEADS

FIND OUT what the PAR Process can save you

PAR stands for **P**roduction **A**utomated **R**iveting. Its objective is cost reduction and increased production rate. It involves a careful study of the complete assembly operation by TRS engineers and your own production men . . . an organized search for opportunities to eliminate or simplify and speed-up steps in the assembly.

An invitation to conduct the PAR Process study in your plant is almost certain to bring you benefits such as those produced for many prominent manufacturers.

Benefits Like These: Often, the PAR Process has led to better integration and higher automation of the various steps in assembly and fastening. In many cases, it discloses ways to improve efficiency through minor modification of existing or standard equipment . . . or a simple change in materials or rivet design as in the case of Ekco. Sometimes, it reduces rejects and other costly elements in the assembly operations. Always, it considers not only human and equipment factors but also the important problems of using the most suitable rivet for the job.

Why is PAR a TRS Process? Because it involves procedures specially organized by TRS. It requires application by the specially trained and experienced TRS Engineers. It demands that unique advantages of TRS developments in rivets and riveting machines be available.

Ask for a check of your operations. Whether your fastening jobs are simple or complex, it can be worth dollars to you.

TRS

TUBULAR RIVET & STUD COMPANY

QUINCY 70, MASSACHUSETTS • TRS SALES OFFICES: Atlanta • Buffalo • Charlotte • Chicago Cleveland • Dallas • Detroit • Hartford • Indianapolis • Los Angeles • New York Philadelphia • Pittsfield • Quincy • St. Louis • Seattle. WAREHOUSE IN CHICAGO

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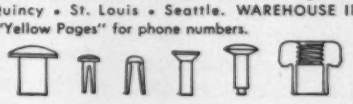


New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 175.

Plant Equipment

Anyone interested in the selection and supervision of plant equipment will find an eight-page booklet very informative. It covers: standard reciprocating, axial-flow and centrifugal air compressors, centrifugal pumps, steam condensers, steam-jet ejectors, vacuum pumps, air hoists, and air and electrical tools. Representative machines in each product line are illustrated, and outstanding design features noted. The booklet also gives the size and capacity ranges of the many units, as well as recommended applications. (Ingersoll-Rand Co.)

For free copy circle No. 1 on postcard, p. 175

Versatile Machine

Performing a variety of drilling, tapping, boring, reaming, and spotfacing operations, a versatile machine is described and illustrated in a bulletin. The unit performs these operations on as many as five sides of a part in one work cycle. (Wisconsin Drill Head Co.)

For free copy circle No. 2 on postcard, p. 175

Barrel Finishing

A comprehensive booklet, on precision barrel finishing, deals with all phases of the operation. Charts and technical data supplement the text, which deals extensively with media and cycles. It also includes a glossary. (BMT Mfg. Corp.)

For free copy circle No. 3 on postcard, p. 175

Seamless Tubing

Consisting of 12 pages, a catalog describes manufacturing capabilities from broad range of ferrous and non-ferrous metals and alloys. Listing sizes (from 0.005-in. OD), wall thicknesses, and tolerances, the catalog also outlines properties and applications of various alloys. In addition, it also describes fabrication service for production of precision tubular parts to specifications. (Uniform Tubes, Inc.)

For free copy circle No. 4 on postcard, p. 175

Master Container

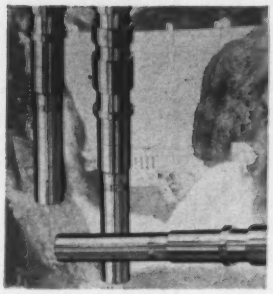
Adjustable in length, width, and height, a master container is always just the right size. A folder gives a photographic, step-by-step story of how the container is put together from eight corner sections. Listed are the specifications for the three standard sizes of the container sections, which allow for a minimum size package of 2268 cu in. and a maximum of 34,656 cu in. The folder points out that the sections may be slotted and scored to any specific requirements. (Signode Steel Strapping Co.)

For free copy circle No. 5 on postcard, p. 175

Valves

Described in a 12-page catalog is a line of three-way valves for air, oil, water, gas, chemical or vacuum service. The bulletin also supplies specifications, ordering information, outstanding features and dimensions. (Airmatic Valve, Inc.)

For free copy circle No. 6 on postcard, p. 175



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Your J&L distributor can reduce your costs by providing a complete range of pre-production services, and doing it economically! He can save you the capital investment required to maintain long term inventories; he can help you eliminate the costs of overhead connected with stocking, accounting, and the inevitable losses incurred through waste and obsolescence due to specification changes.

Technical assistance in solving production problems is also available from your J&L distributor . . . when those problems are connected with an application using stainless steel, J&L's own staff of technical specialists will promptly answer your distributor's call for additional help.

Even when advanced research is required you can call on your J&L distributor in confidence. He will be happy to discuss your problem because he knows he is backed by one of the world's most respected teams of metallurgists—J&L's own staff in laboratories at Detroit and the famous Graham Research Laboratories at Pittsburgh.

Your J&L distributor is as near as your telephone. Call Western Union Operator 25 for the name of your J&L distributor of Consistent Quality stainless steel.

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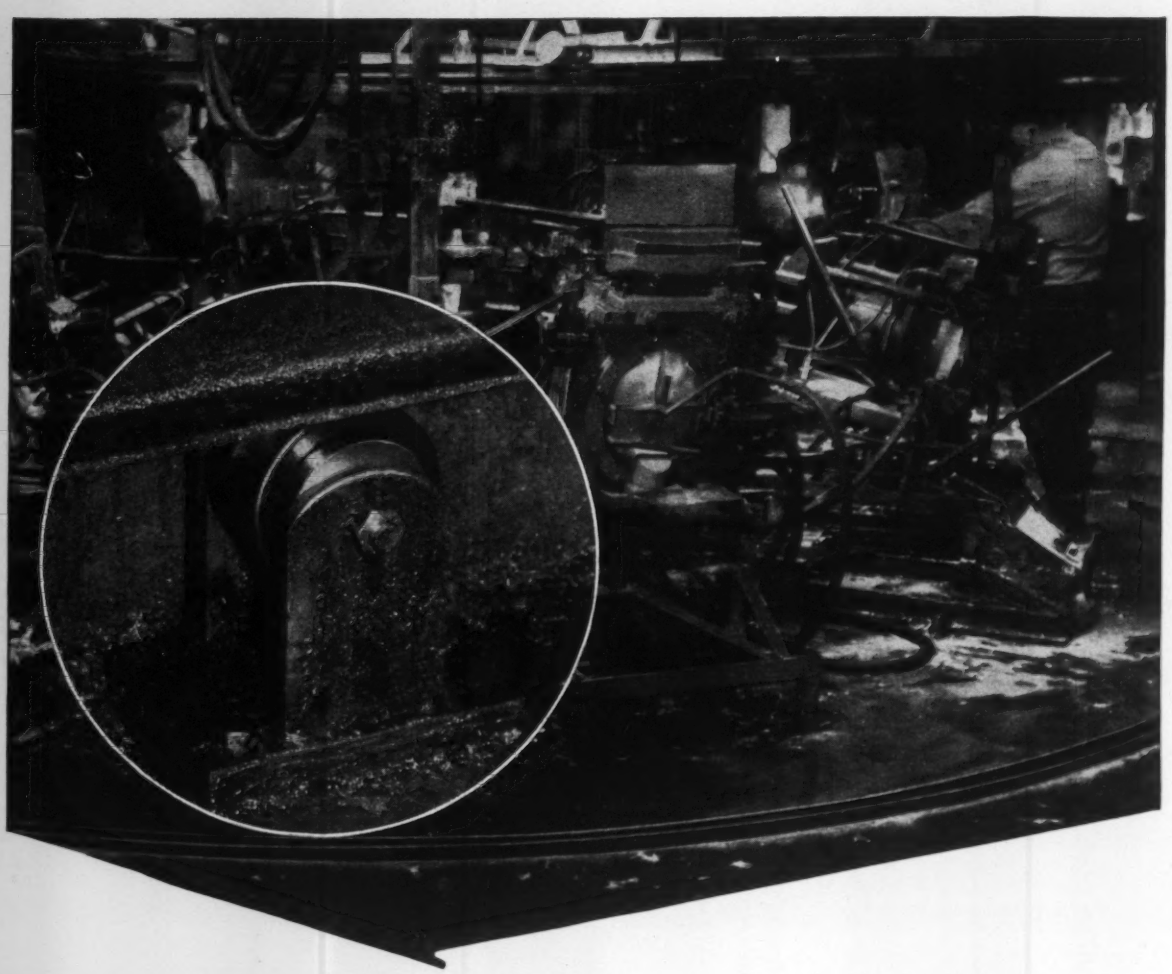

Bearings, Inc. turned this turntable from a costly maintenance problem into a smooth, trouble-free operation!

Our customer, an aluminum foundry, designed and built this system for continuous and automatic pouring of permanent mold castings. The turntable is approximately 20 feet in diameter. Supporting the table, which weighs several tons, were 20 large, double-row bearings. The life of these bearings was only a few weeks and their cost, plus downtime, was becoming increasingly expensive.

Our bearing engineers were asked for a solution and, after an investigation, recommended a camroll bearing. Now, after many months of operation, all turntables in the plant are equipped with the bearings we recommended and there has not been a bearing failure in that period!

If you have a problem involving bearings, call the Bearings, Inc. branch nearest you for expert help. We are the authorized distributor for all the bearings we sell —your guarantee that the bearings we deliver will be of the latest manufacture and right for your application!

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FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Molded Fiber Glass

Molded fiber-glass, pipe-fitting insulation is reported in a bulletin. Supplied is a description of the features of the insulation that give it thermal insulating advantages over conventional pipe-fitting insulation. Design features are stressed. In addition, the brochure also gives full insulation specifications, and dimensional data. (Fibrous Glass Products, Inc.)

For free copy circle No. 21 on postcard

Comparators

A fast-reading little booklet concerns itself with optical comparators. The 20-page booklet tells what they are and what they do. (Jones & Lamson Machine Co.)

For free copy circle No. 22 on postcard

Flow Counters

Covering pre-flush flow counters, a short brochure describes two models. The brochure covers all technical details, outlines operating procedures, and gives detailed specification data. (The Victoreen Instrument Co.)

For free copy circle No. 23 on postcard

Safety Tools

Non-sparking safety tools are described in a 24-page catalog. The safety tools are approved for use where a hot spark could mean fire or explosion. (Ampco Metal, Inc.)

For free copy circle No. 24 on postcard

Fork Trucks

Designed for operation over rough, soft or difficult terrain, two fork trucks are described and illustrated in an eight-page brochure. The trucks have a capacity of 4000 and 6000 lb, respectively. They are widely used in steel, lumber, and construction industries. (Clark Equipment Co.)

For free copy circle No. 25 on postcard

Free-Cutting Rods

A 20-page booklet describes free-cutting rods. Included are rod and bar tolerances, weights, specifications, and complete size ranges for Nittany free-cutting brass, leaded naval brass, leaded manganese bronze, free-cutting commercial bronze, and leaded nickel-silver alloys. The booklet also has information on the company's machinability research, quality control, and suggestions in choosing a rod alloy or temper. (Titan Metal Mfg. Co.)

For free copy circle No. 26 on postcard

Hot Plate

A portable, electric hot plate is illustrated and described in a pamphlet. The hot plate is ideal for many industrial laboratories with limited volume of hot-plate work. The pamphlet also contains information on a standard line of heavy-duty hot plates for general heating, boiling, and evaporations. (Lindberg Engineering Co.)

For free copy circle No. 27 on postcard

Level Indicator

The subject of a bulletin is how material-level indicators accurately and automatically control the level of pulverized, fine, crushed, or granular material in a bin or silo. A general-purpose model and a specially-designed model, for hazardous dust conditions, are discussed. Current requirements, control switches and a safety pulse switch are also covered. The bulletin also contains a full-page schematic drawing of a material-level indicator, and a photograph of a typical installation of a vertical-mounted indicator. (Fuller Co.)

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Ball Bearings

High-precision, radial ball-bearings are described in an eight-page catalog. The new bearings use maximum ball complements for higher

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FREE LITERATURE

load capacities. Full-depth races, with no loading slots, enable the bearings to carry thrust loads from either direction. (Split Ballbearing)

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Sheet Metal

Describing a low-cost sheet metal, a brochure lists physical and mechanical properties of the metal. Featuring extreme strength and many applications, the metal is an alloy of zinc, copper and titanium. The literature also contains a list of sixteen advantages of working with this metal. (Whitehead Metals, Inc.)

For free copy circle No. 30 on postcard

Radiant Heat

Showing typical installations, an eight-page, two-color bulletin gives full information on infra-red ovens and components for metal-processing applications. (Fostoria Corp.)

For free copy circle No. 31 on postcard

Mill Products

Contained in a 24-page booklet is a guide to the selection of aluminum alloys, for virtually any product that can be made of the light metal. The booklet describes the physical properties, fabrication characteristics and economic advantages of a wide variety of aluminum sheet, plate, rod, bar, extrusion, and casting alloys. The booklet is illustrated with photographs showing different phases of the company's ingot casting, sheet rolling, extruding, and other operations. (Olin Mathieson Chemical Corp.)

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Gaging Problems

A four-page booklet pictures and explains new approaches to gaging problems. It shows suggested uses of Tenth Plug gage kits and microball gage kits. The information given is applicable to most other types of gages, and illustrates methods of shortcutting many normally-tedious production and inspection jobs. (HI-Precision Grinding, Inc.)

For free copy circle No. 33 on postcard

Precision Spindles

Spindles for grinding, boring, milling, slotting and drilling are featured in a pocket-size, 36-page bulletin. Many of the spindles presented in this bulletin haven't been previously presented. Interchangeable extension arbors and wheel holders are also described. (Pope Machinery Corp.)

For free copy circle No. 34 on postcard

Stainless Steel

Completely revised and up dated, a booklet deals with the popular Chromium-Nickel types of stainless steel. The 40-page booklet contains sufficient general information and technical data to enable users of stainless to make correct design and buying decisions. (Republic Steel Corp.)

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Glass Heat Shield

Properties and data on Pyrex heat shields are provided in a bulletin. The heat shields give protection from long-wave-length infrared radiation. The heat shield is particularly applicable to installation in steel-mill pulpits and crane cabs. It also has other uses in connection with furnaces, ovens, and high-temperature lighting. (Corning Glass Works)

For free copy circle No. 36 on postcard

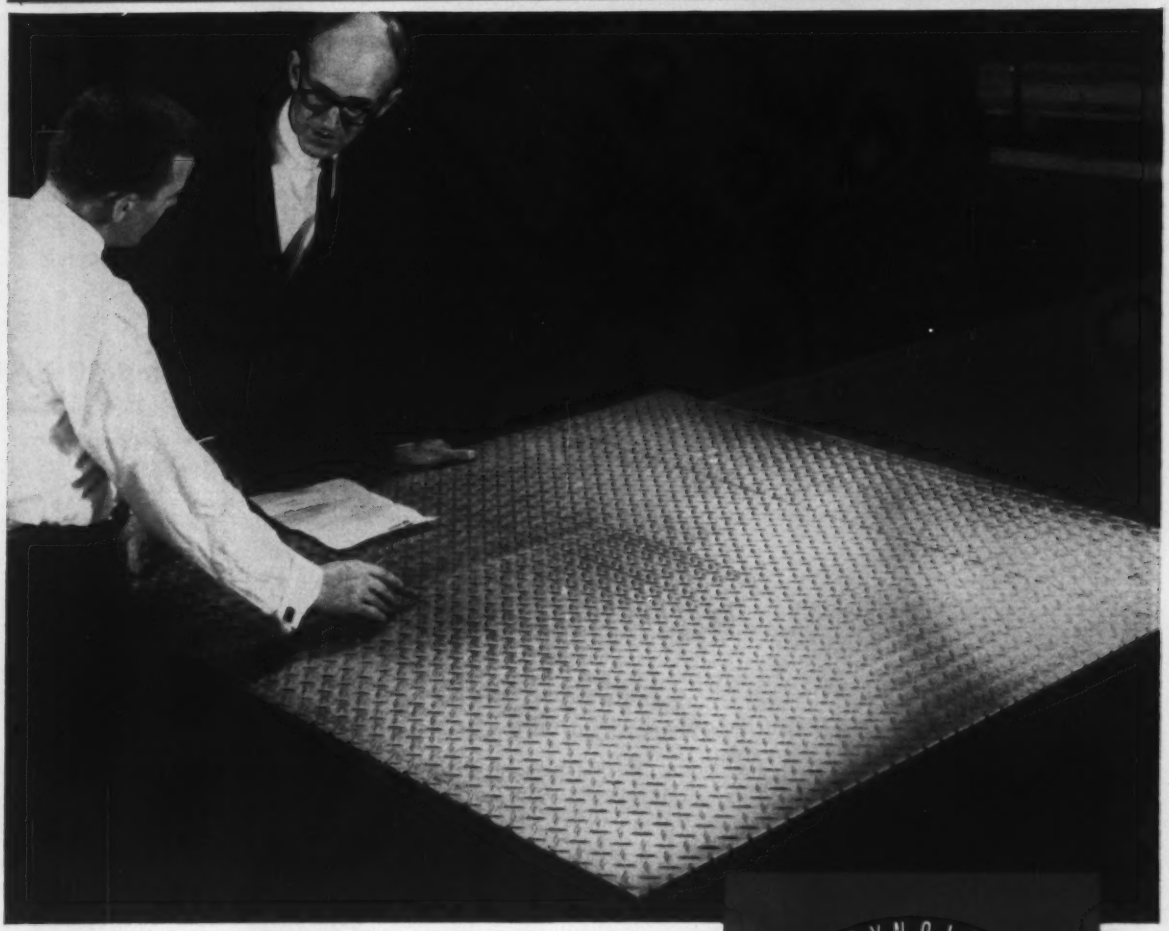
Multiple Heads

The subject of a fold-out catalog is multiple tapping and drilling heads. The five available models convert any drill press into a high-production, multiple drilling and tapping machine. The line covered in the catalog includes circle types with 4, 6, or 8 spindles, as well as the 6 and 11 spindle straight-line models. The catalog also describes: face plates, gear cases, pitch compensating chucks, templates for fixed-spindle operation, guide rods or base and rods. (Ettco Tool & Machine Co., Inc.)

For free copy circle No. 37 on postcard

aluminum tread plate

...or practically any aluminum mill product



and specialized technical help

from the Reynolds Distributor

It may just be that you could get a lot more production efficiency and product quality from your aluminum. A different alloy may do it . . . or a faster machining speed . . . or another joining method. You can get expert, specialized technical help with any aluminum product or production question from your Reynolds Distributor. His men are trained to help you get the most from your metal. And they'll see that you get the alloy, size, kind and quantity of Reynolds Aluminum you need, *fast. Reynolds Metals Company, P.O. Box 2346-DH, Richmond 18, Virginia.*

REYNOLDS ALUMINUM

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"ADVENTURES IN PARADISE",
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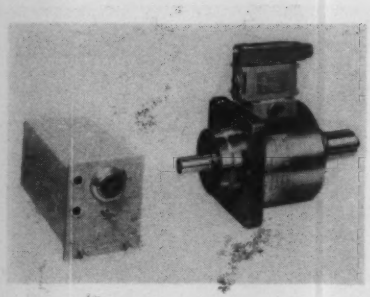
For the name of the nearest Reynolds Distributor, look under "Aluminum" in your classified phone book

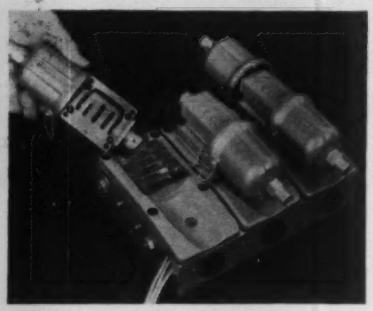
New Materials and Components



Servo Drive Systems Give High Performance

A series of servo drive systems features performance of the drive in the zero speed region. In this region is where speed regulation, no load to full load, and long-term speed stability are typical of the order of 0.1 rpm. This, along with the high available torque, enables direct coupling of the servo drive to such loads as machine tool lead screws without intermediate gear reduction. The no-load to full-load regulation, at the high end of the speed range, is about 0.2 pct. (Pegasus Laboratories, Inc.)

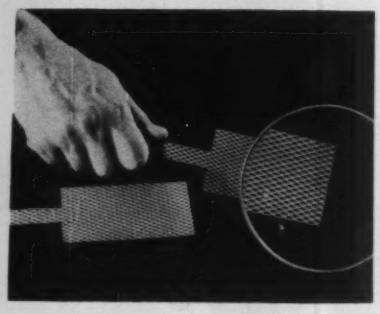
For more data circle No. 38 on postcard, p. 175



Air Valves Feature Ganging in One Compact Unit

Solenoid-operated air valves combine easily and quickly to provide a single, compact and inexpensive manifold to suit the exact requirements of any application. Two to ten (or more) manifold-base, 4-way valves, when ganged together, form a common inlet, common exhaust and common conduit channels. If more than one pressure is to be used, valves can be isolated and pressure fed from each end of the manifold. Electrical wiring is greatly simplified. Each manifold base has receptacles with attached leads for quick positive connections. (Mechanical Air Controls, Inc.)

For more data circle No. 39 on postcard, p. 175



Platinumized Anode Functions as Solid Platinum

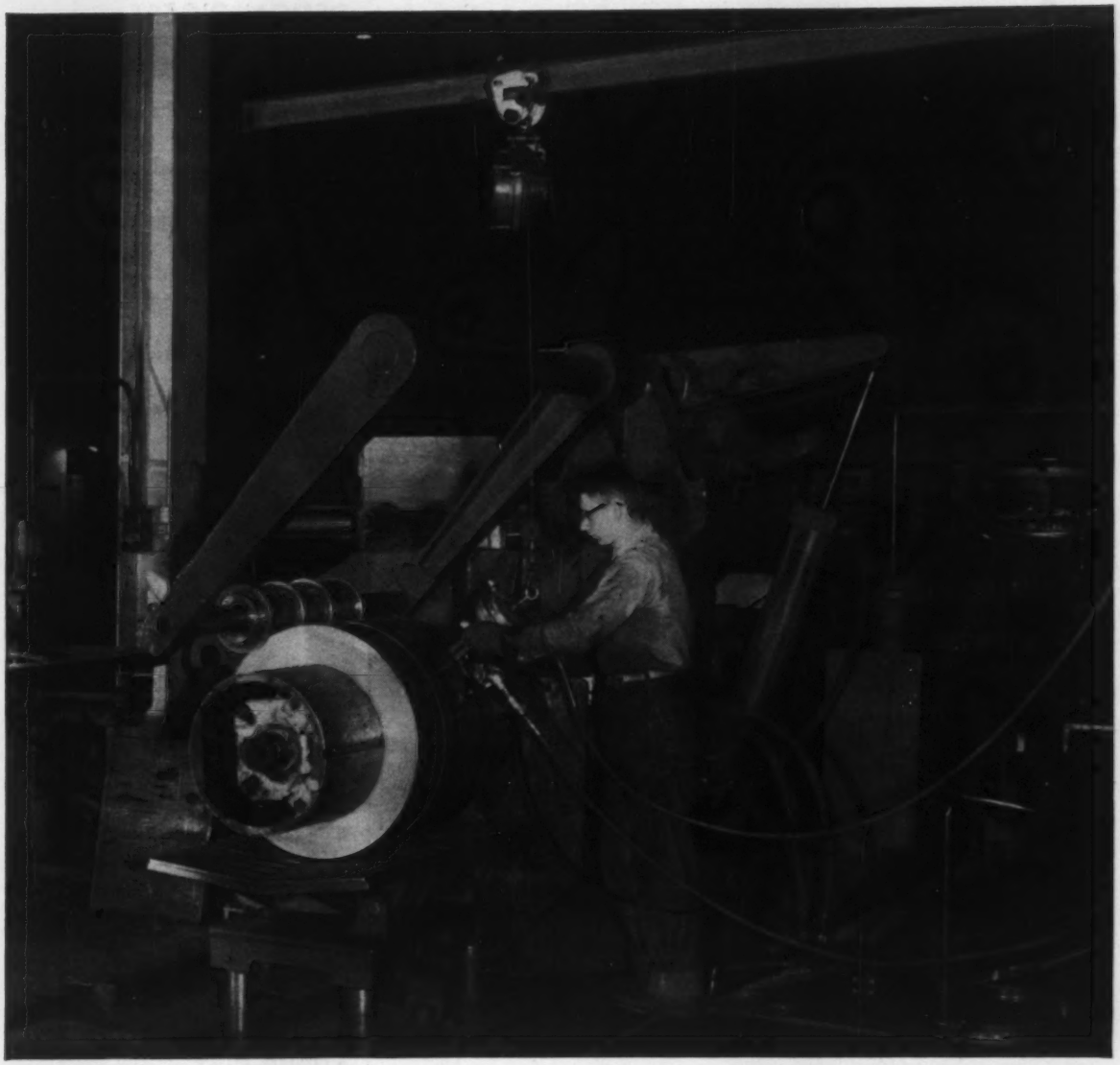
Doing the job of solid platinum anodes at 1/10th the cost, a platinumized titanium-mesh anode consists of a diamond configuration design. This design affords maximum anode area while cutting down over-all size 50 pct or more. The anode, manufactured from titanium mesh, is coated with a uniform thickness of platinum metal, electrolytically bonded by the manufacturer's patented process. The anodes are recommended for a wide range of electrolytic operations—from electroplating to refining and chemical processing. (Sel-Rex Corp.)

For more data circle No. 40 on postcard, p. 175

Low-Cost Insulation Provides Handsome Ceiling

Specifically designed for use in metal shops, a reflective ceiling insulation requires no expensive, extra supports. Constituting a handsome, maintenance-free ceiling, the aluminum-foil product actually costs no more installed than a two-coat paint job. Each blanket consists of aluminum-foil layers that reflect 97 pct of all radiant heat, and block heat by convection. The foil layers form reflective air spaces that hold conduction to a minimum. The insulation also incorporates vapor-proof backing for positive protection against condensation. (Reflectal Corp.)

For more data circle No. 41 on postcard, p. 175



Strip steel coils strapped fast

With a Signode air-power tensioner and air-power sealer, this operator puts a strap around a coil complete in a few seconds. Straps are uniformly tight and securely sealed. Strapping the coils on the mandrel simplifies further handling. The strapping is taken directly from the dispenser behind the operator. There's no waste of strap.

This time-saving use of Signode steel strapping is one of many hundreds in major steel mills and in steel service centers across the country. It is typical in that the method—of which the right strapping tools are a part—is near-perfect for the job because of the interested attention of an experienced Signode man. May we have such a man help you? A new 4-page folder, "Air Power Tensioners and Sealers" is yours for the asking. Write for your free copy today.

First in steel strapping

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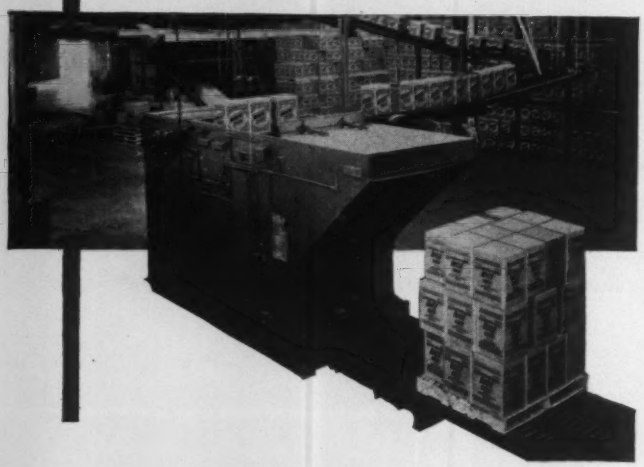
...with a LAMSON AUTOMATIC PALLET LOADER



Palletizes cartons, cases, rigid bags quickly, economically

Referred to as the "perfect link between packaging and warehousing," the LAMSON AUTOMATIC PALLET LOADER is acclaimed as a huge, money saver by leading producers of package products.

Man hours per pallet load are cut. Considerable saving occurs in the reduction of damage or breakage to cartons. Valuable men are freed for other important duties.

These reductions have been more than enough to amortize the entire cost of the LAMSON AUTOMATIC PALLET LOADER.

The introduction of the Automatic Pallet Loader was another LAMSON first in the materials handling field. A result of the ceaseless engineering vitality of LAMSON men firmly based upon 75 years of experience.

Why not bring your materials handling problems to the leaders in the field? Write LAMSON today for the name of your nearest Field Engineer. Or, simply clip this advertisement to your letterhead and mail to:

LAMSON

PIONEERS *the Conquest* OF INNER SPACE

LAMSON CORPORATION

504 Lamson Street, Syracuse 1, New York

PLANTS IN SYRACUSE AND SAN FRANCISCO • OFFICES IN ALL PRINCIPAL CITIES

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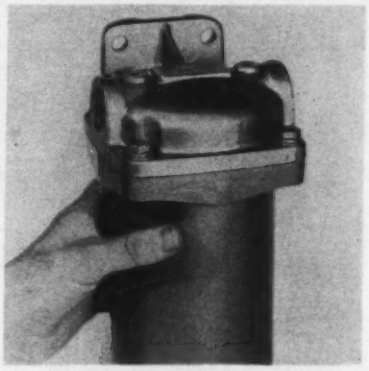
DESIGN DIGEST

Filters

Used in the filtration of most fuels, lubrication oils, hydraulic fluids, air and other gases and liquids, a line of general-purpose filter assemblies has pore-size ratings from 2 to 100 microns. They are available with five different element materials—woven wire cloth, sintered bronze, pleated resin-impregnated cellulose sheet, stacked

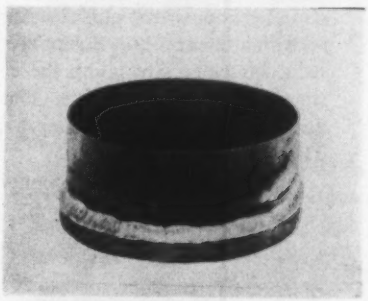


resin-impregnated cellulose washers, and helically-wound resin-impregnated cellulose ribbons. The overall temperature range covered by these elements is —350° to +350°F. Flow rate and pressure-drop ratings for these filters depend on filter element materials and fluids to be filtered. (Bendix Filter Div., Bendix Aviation Corp.)

For more data circle No. 42 on postcard, p. 175

Liquid Flux

For brazing and welding, a liquid flux enables continuous brazing operations without the necessity of painting the metal with powdered



flux; and without dipping the welding rod into powdered flux. The flux is in the flame automatically, for this new flux is vaporized and

inducted into the gas stream automatically, as required. It passes through the welding torch into the flame. Wherever the flame goes, there is automatic fluxing. (Rexarc, Inc.)

For more data circle No. 43 on postcard, p. 175

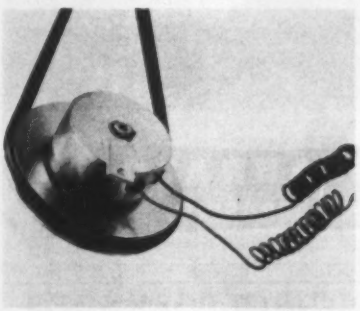
Epoxy-Base Ink

A permanent marking ink eliminates smeared stencil information. It resists the effects of such cleaning solutions as xylene, toluene, chlorothene, solox and methyl alcohol. The ink can be applied to metal, plastics, glass or wood. Markings are color stable on surfaces exposed to temperatures up to 260°F for the white ink, and 350°F for the black. Its uses include: identifying nomenclature on sheet-metal chassis, glass dials, magnetic tapes, printed - circuit boards and all types of components. (Melpar Inc.)

For more data circle No. 44 on postcard, p. 175

Positive Clutch

Designed for instrument applications where a minimum space is available, a miniature positive clutch has 1½-in. diam and is ¾-in. long. The clutch's positive-acting crown teeth are magnetically engaged and spring released. The



teeth are pitched for easy engagement at very low revolutions per minute; and then smooth acceleration drives the load. The clutch develops 80 oz-in. torque, and may be wound for 28-v dc. (Stearns Electric Corp.)

For more data circle No. 45 on postcard, p. 175

Sheaves

A series of seven variable-speed sheaves covers a range of from 2 to 15 hp. The horsepower ratings are based at constant torque and for maximum speed. The pulleys incorporate a design that eliminates fretting corrosion as well as freezing and sticking. There are no keys in the bearing surfaces to establish constant point contact and obstruct lubrication. Bearing surfaces are re-oiled with each rotation of the

pulley. The sheaves are designed for use with angled motor bases and V-groove companion sheaves to provide a V to V drive. Use of the V-groove companion sheave results in higher rpm, and greater horsepower output that can be achieved when flat companion pulleys are used. (T. B. Wood's Sons Co.)

For more data circle No. 46 on postcard, p. 175

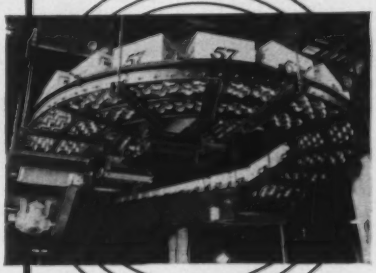
Paste Rubber

Rubber in paste form serves as a general-purpose repair material. It has tremendous strength, and is an excellent adhesive for rubber, iron, steel, aluminum, bronze, ceramic, wood, plastics, and other materials. Permanently flexible, it is easy to use, waterproof, fast setting, and is unaffected by oil,

gasoline, and most chemicals. Among its many uses are: sealing or caulking around machinery, insulating electrical equipment, making gaskets, and as a protective coating on machinery, and piping;

MECHANIZE... PROFIT-WISE!

WITH LAMSON ENGINEERED CONVEYOR SYSTEMS



Engineers Break A Bottleneck

It's True.
Mechanization will increase the capacity of your present buildings and the production of your present equipment. Increased profits will amortize the expense.

But, you need the touch of experienced materials handling engineers to guarantee this result. That is where LAMSON leads all the rest.

During the past 75 years, LAMSON engineers have created more custom engineered conveyor systems that have cut costs, raised production and profits than any other firm. For complete, professional service from problem analysis through installation and beyond, you can depend on LAMSON.

Write LAMSON today for a complete conveyor catalog. It may provide the answer to your materials handling problem. Or, simply clip this advertisement to your letterhead and mail to:

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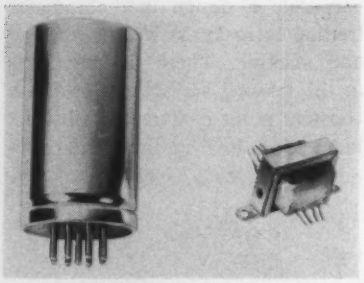
OFFICES IN ALL PRINCIPAL CITIES

it repairs torn conveyor belting and skidproofs wet factory floors. (Devcon Corp.)

For more data circle No. 47 on postcard, p. 175

Commercial Chopper

A chopper and associated input/output transformer feature specific design for commercial test and control applications. Such applications are: dc amplifiers, comparators, null indicators and servo systems where signals as low as 1 millivolt must



be identified. This component combination can be used as a null indicator, modulator, or demodulator. The chopper has low residual noise, coil voltage is 6.3 v, ±10-pct rms. Life in excess of 2500 hours can be expected in most applications. The associated series of transformers is of a unique 4-winding 8-terminal balanced design to permit step-up or step-down application with series or parallel impedance combinations. (James Electronics, Inc.)

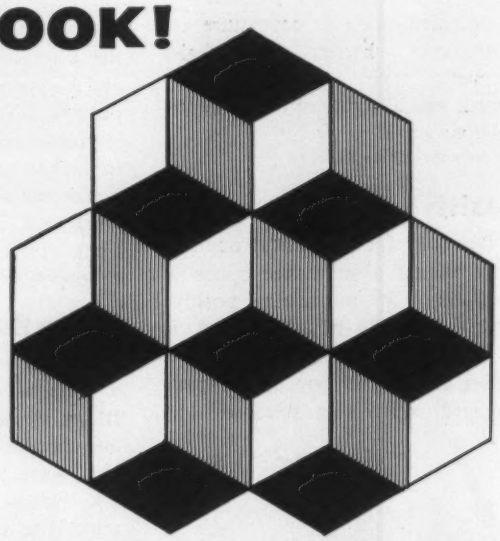
For more data circle No. 48 on postcard, p. 175

EXECUTIVE REPORT #17

TAKE A SECOND LOOK!

Are you getting FULL Value for your Abrasive Dollar?

Count the cubes in the figure. You'll see six or seven, depending upon your point of view. Consider the total value of your present abrasive, and compare it with the proven value of Wheelabrator Steel Shot. Not just in price, but in abrasive consumption, cleaning speed, cleaning quality, and equipment maintenance costs as well. From any point of view, the proven quality of Wheelabrator Steel Shot adds up to extra value and extra profit.



Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

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STEEL ABRASIVES

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HOIST HOOKS

Correctly engineered, drop forged and heat treated. Strong—max. load is 4 times rated "safe work load"; elastic limit approximately twice rated load. Inside hook sizes from ¾" to 4". Capacities ½ to 25 tons. For safe dependable service . . . specify ARMSTRONG Hoist Hooks. Write for Catalog.

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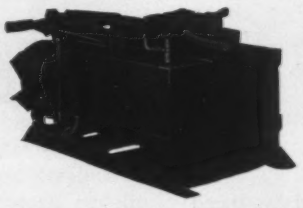
MULTIPLE SPINDLE
CHUCKING MACHINES
Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

KARDONG CIRCLE BENDER
For Concrete Reinforcing Bars

This is a powerful and fast machine for heavy duty work in both fabricating plants or in the field where large tonnage is required. It will handle as high as 20 tons a day. Circles of any size required in concrete reinforcing work from 18 inches in diameter up can be bent on this machine. It will bend bars with two or more radius on the same bar without stopping the machine.



Made in two sizes,
Model "C" Capacity
1¼ inch
Model "CA" Capacity
1 inch
Write for catalog of our complete line of reinforcing bar benders

KARDONG BROTHERS, INC.
MINNEAPOLIS 13, MINN.

AUTO MAKER WANTED FASTER PRODUCTION

...and got it from DANLY®

Deep draw body parts were the bottleneck when presses for the job couldn't deliver more than 7 fender draws per minute. So Danly supplied a double-action press equipped with a DANLY 2-SPEED CLUTCH that automatically speeds up approach and return of the slides, but keeps draw speed safe and slow. The rate was raised to 10 draws per minute without speeding up the critical drawing action. Output jumped from 420 to 600 parts per hour... a healthy 43% improvement.

And, typical of Danly equipment, both press and clutch have performed without a single interruption in output for maintenance. Another example of Danly ability to solve metal stamping problems with dependable, versatile equipment... this time with a low-inertia,2-SPEED CLUTCH that makes a top-notch press even better!

Danly manufactures a complete line of mechanical presses, in capacities from 25 tons to 4,000 tons ... and up. Send for your copy of the Condensed Catalog of Danly Presses and ask for detailed information on The DANLY 2-SPEED CLUTCH ... NOW.

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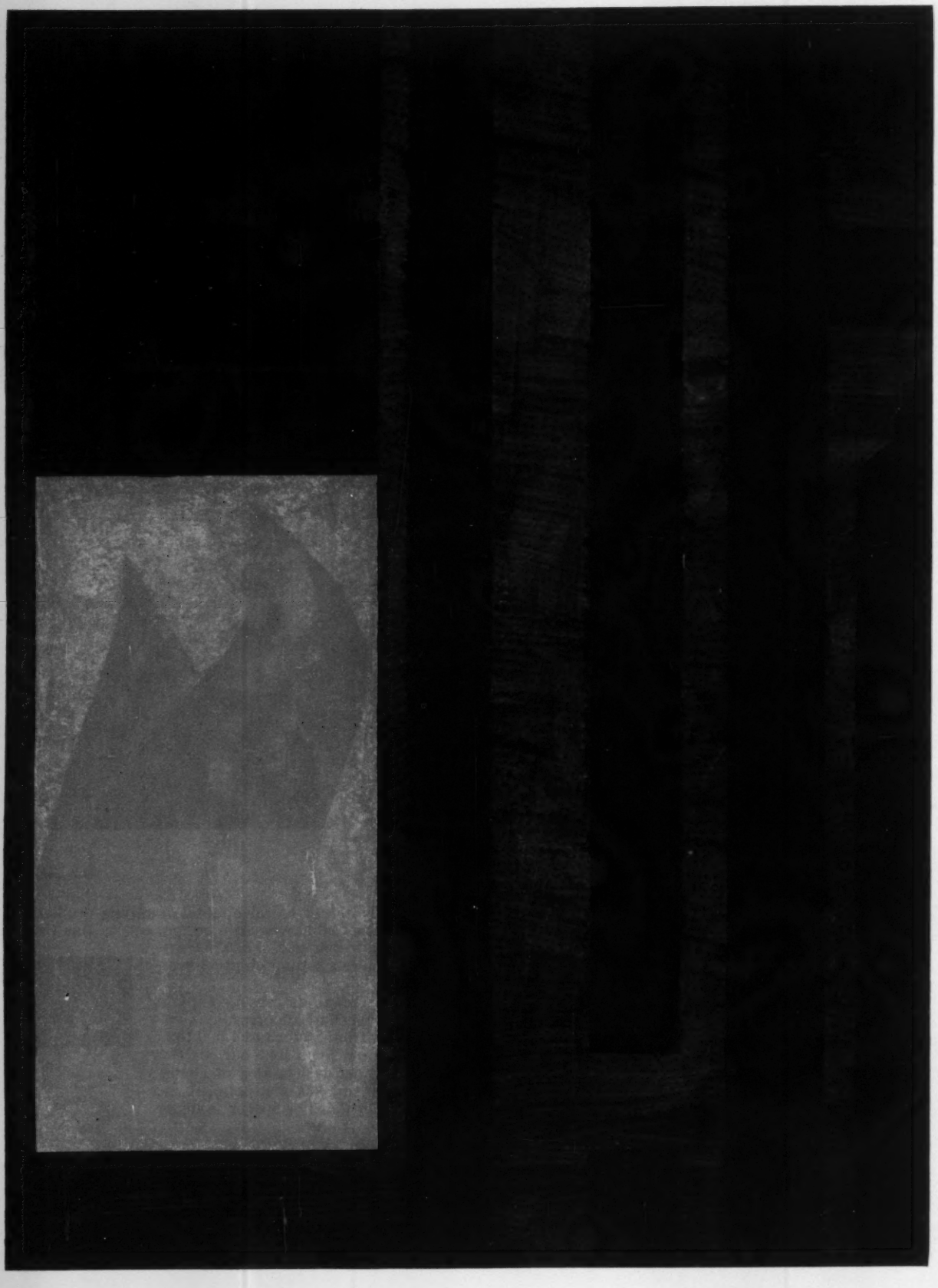

.... ANOTHER RECORD FOR FOUNDRY OPEN HEARTH BOTTOM PERFORMANCE USING PERMANENTE 165 RAMMING MIX

This outstanding performance record was recently established in the #7 furnace at General Steel Castings after switching to Permanente 165 for the foundry open hearth furnace bottom. The heats average 50–60 tons in the 80-ton capacity furnace. Normal fettling time is 20 minutes.

The furnace normally makes three types of steel: armor grade, Grade "A" (1020 steel) and nickel. With the Permanente 165 bottom, one type is made right after another without notable pickup of undesirable elements.

EXCEPTIONAL PERFORMANCE IS THE RULE

Operators who have switched to Permanente 165 Ramming Mix consistently report exceptional performance—whether for furnace bottoms, for new tapholes or for hot tapholes. Permanente 165 is made from high purity Kaiser Periclase refractory grains (95–96% MgO) and ceramically bonds itself into a crystalline mass at relatively low temperature—providing fast furnace availability.

This monolithic structure has exceptional volume stability, maximum resistance to hydration and to attack by iron oxide and slag. For furnace bottoms, its high density (averaging 175 pounds per cubic foot after firing) assures longer life. Make your own test and see how much more service you get with Permanente 165 Ramming Mix. Your Kaiser Refractories representative will be glad to help.

New Permanente 165 bottom in #7 O.H. furnace at the Granite City, Illinois, plant of General Steel Castings Corporation.

KAISER REFRACTORIES

Mexico Refractories Company Now Merged with Kaiser Refractories

Call or write Kaiser Refractories & Chemicals Division, Kaiser Aluminum & Chemical Sales, Inc., at any of the offices listed below:

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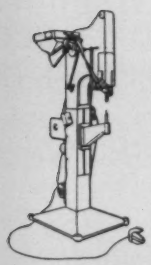
Ask to see the 30-minute color movie, "Progress in Modern Basic Refractories." Arrangements will be made by your Kaiser Refractories Sales Representative or Regional Office.


Model 423

Model 250

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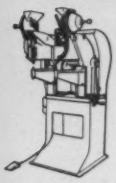
FLEXIBLE
RIVETER LINE
CAN HELP CUT
YOUR ASSEMBLY
COSTS

Milford adapts to your production line with a wide range of automatic riveters designed to cut assembly costs. Count on Milford's versatility to come up with answers you need at substantial cost savings over other fastening methods. Write for more information.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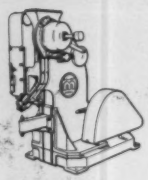
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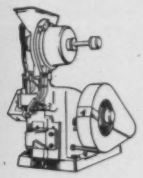
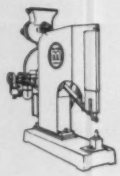

Model 52-S-55


Model 56

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NEW BOOKS

"Tin and its Alloys," edited by E. S. Hedges, deals with tin's properties and applications. After a general description of the tin industry, the book lists the versatility of the materials, examines their physical and mechanical properties, describes their chemical behavior during electro deposition, hot-tinning and corrosion. The editor, who is director of the British Tin Research Institute and director of the International Tin Research Council, also deals with practical uses of tin and its alloys. Throughout his text, Dr. Hedges takes care to maintain a useful balance between theory and practice. 424 pp. $27.50. St. Martin's Press, Inc., 175 Fifth Ave., New York 10.

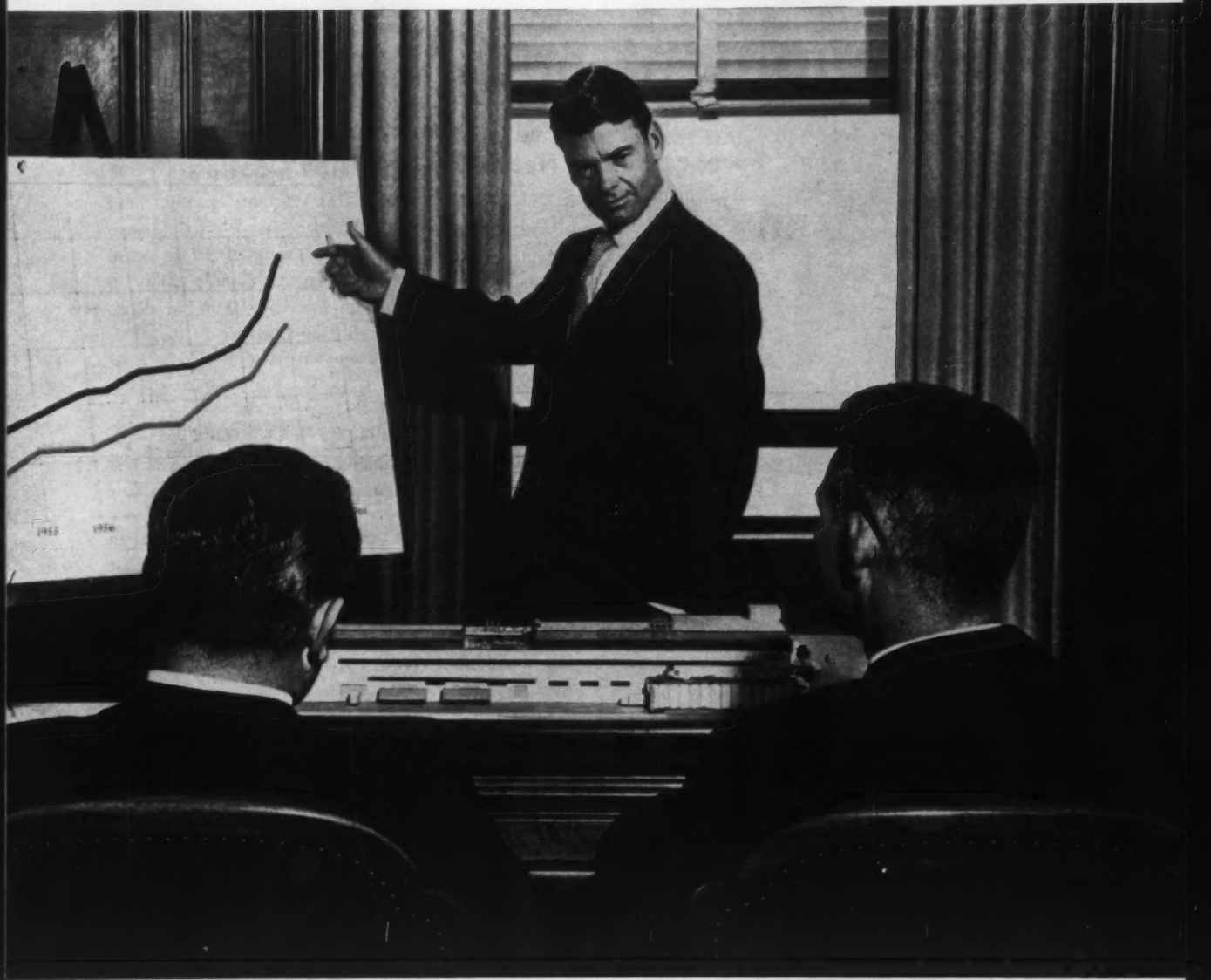
"Trademark Management — A Guide for Businessmen," gives the businessman sufficient grasp of the subject to enable him to keep the problem within control. In simple, non-technical language, the book was written by outstanding trademark authorities drawn from the nearly 300 major American businesses which are members of the association. The book is not intended to eliminate the need for legal counsel with respect to registration and policing, but to avoid the complex trademark hazards. The book covers such key policy steps as selection, registration, proper uses, means of protection, effective policing, differences between trademark and trade name, and problems of protecting a U. S. trademark in foreign market. $3.00. U. S. Trademark Assn., New York.

"Mechanized Charging of Furnaces for the Production of Ferroalloys," by N. D. Shkoly of the USSR, deals with the development of a charging machine for three-phase furnaces which produce ferrosilicons and other ferroalloys. The 1000-word translation also contains a general view of the machine — equipped with a rotating feed pipe and installed next to the furnace. First and second improved designs, developed at the Siberian Metallurgical Institute, are discussed. The short translation presents: particulars on the capacity of the machine; details on the movement of charges (including bulky chips); data on the best revolution rate for the feed pipe; and information on the uniformity of charge distribution. 1000-word abstract. $2.80. Order from: Henry Brutcher, P. O. Box 157, Altadena, Calif.

"Foundry Engineering," by H. F. Taylor, M. C. Flemings, and J. Wulff, explains the basic engineering aspects of the materials and methods employed in making castings. Most of the chapters concern the engineering principles of founding, and the applications of these principles to practice. But the fascination of founding as a craft is also conveyed in the background of historical and artistic traditions surrounding the castings of metals. Throughout, the terminology conforms strictly to correct operational and scientific usage. The trend of the entire book is to use the most simple means of description and give straightforward presentation. 408 pp. $9.75. John Wiley & Sons, Inc., 440 Park Ave. South, New York 16.

"Distortion in Tool Steels," by Dr. B. S. Lement, pays particular attention to methods of heat treatment that are necessary for precise dimensional control. Problems involved in producing tool-steel parts with tolerances less than 0.0001 in. are treated in detail. Consideration is also given to the prevention of significant changes in finish dimensions during storage or under normal service conditions. The book's eight chapters cover such aspects of distortion as its nature, measurement and testing, quantitative prediction, control, relation to specific heat-treating operations and occurrence on aging. The author stresses selection of tool steels having the most desirable size- and shape-stability for specific uses. 173 pp. $10.00. American Society for Metals, Metals Park, Novelty, O.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...



Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers designs and builds for the Steel industry...offers skilled experience in all types of facilities from raw material plants to finishing mills. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

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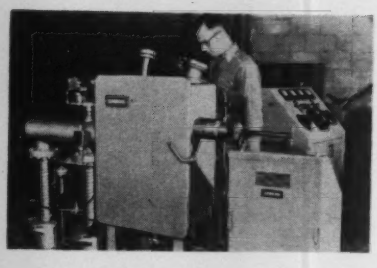
6229-S

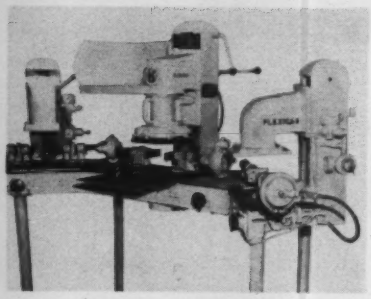
New Equipment and Machinery



Furnace Fulfills Needs for Precision Casting

The rapidly growing demand, for precision castings of high-alloy metals and other metals which must be melted and poured under high-vacuum conditions, is satisfied through the use of a vacuum furnace. This vacuum melting and casting furnace has a crucible with a melting capacity of 17 lb (steel measure), and can handle molds up to 15-in. high by 10 in. in diam. (F. J. Stokes Corp.)

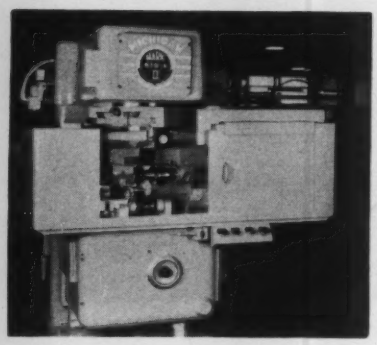
For more data circle No. 52 on postcard, p. 175



Foundry Machine Blows and Gases CO_2 Cores

Providing maximum efficiency, a package unit produces CO_2 cores at a speed comparable to oil and sand core production. The unit consists of one core blower and two gassing units, mounted on a single, semi-circle table. The semi-circle design of the table minimizes operator movements for maximum production. Because it takes longer to gas a core than it does to blow a core, the two gassing units balance the operation. A core is blown, then inserted for gassing. While the first core is being gassed, a second is blown and also inserted for gassing. (Beardsley & Piper Co.)

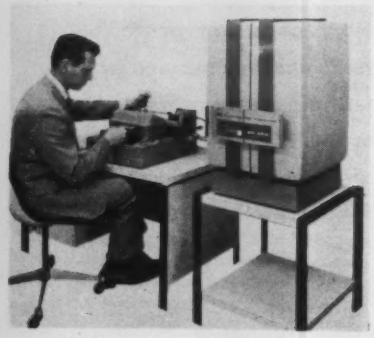
For more data circle No. 53 on postcard, p. 175



Precision Gear Shavers Feature Easy Operation

Offering increased productive life and greater precision, a line of rotary gear shaving machines consists of three types. They are—an underpass, an internal and a universal gear shaver. There are three sizes of machines—four gears up to 8-, 12-, and 18-in. diam respectively (up to 12-in. diam for internal gears). One of the gear shavers' most interesting features is the ease with which it can be shifted from one size or type of gear, or one processing method to another. The majority of machine settings are dial controlled. Feed rates of ½ to 10 ipm are easily selected to suit work conditions. (Michigan Tool Co.)

For more data circle No. 54 on postcard, p. 175

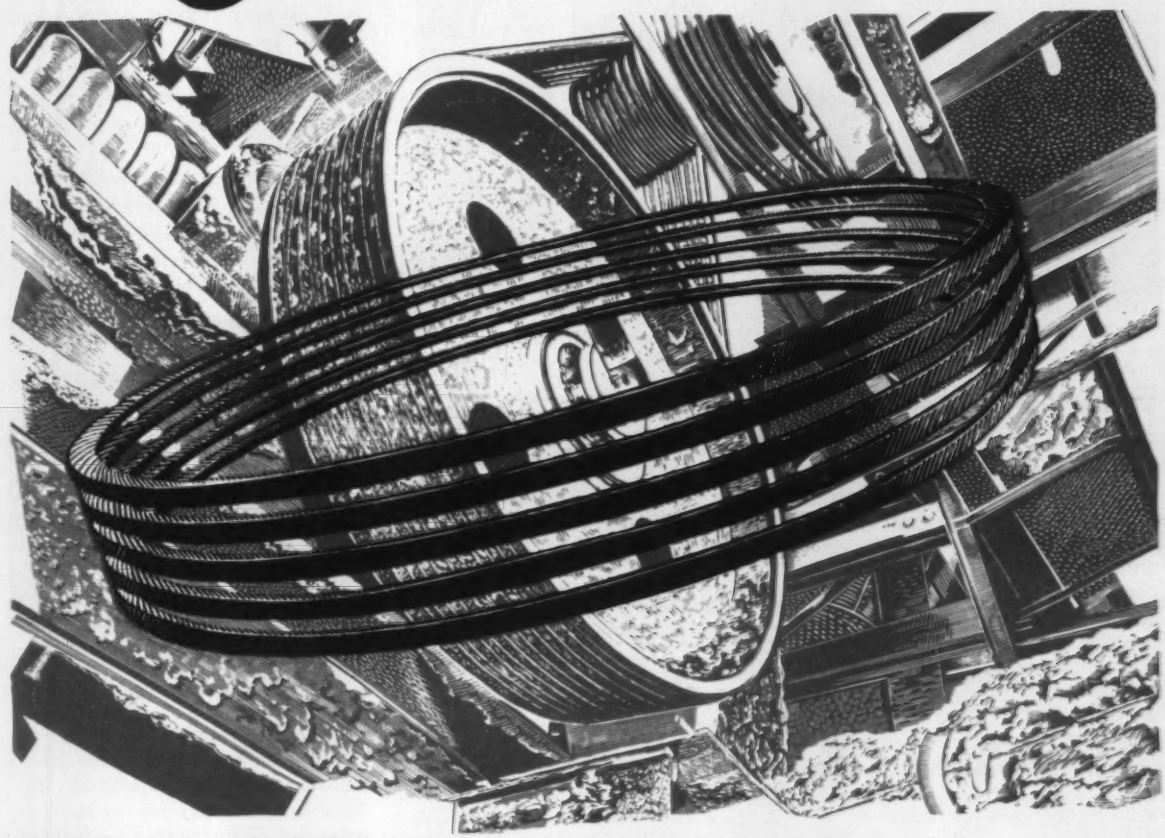


Computer Integrates Easily into Existing Systems

An ultra-fast, general-purpose, digital computer combines a large, expandable memory and a versatile command structure, with a computing speed in the microsecond range. Applied to an extremely broad range of scientific, industrial, and military problems, the computer can be used for either on- or off-line applications. The unit excels as: an engineer's desk-side computer; an on-line computer for process monitoring, process control, data logging, and alarm generation. It is a serial, binary, single-address computer with an internally-stored program. All memory operations are parity checked. (Packard Bell Computer Corp.)

For more data circle No. 55 on postcard, p. 175

U. S. ROYAL V-BELTS from the Power Unlimited complete belt line



"Swinging Loads" demonstrate how

balanced driving power pays off

The flywheels on stone-crushing machinery at the Bethayres Concrete Products Company in Bethayres, Pa., put V-belts under a "tremendous strain."

Not only must each set of 8 U. S. Royal V-Belts driving the flywheel operate under extremes of abrasive conditions, it must also operate on constantly changing centers. As incompressible foreign matter enters the driven rollers, they swing or oscillate to allow passage. The result is constantly changing tensions under pressures amounting to many tons!

Yet even with this constant change in tensions and the severity of the abrasive conditions, the U. S. Royal V-Belts continue to share the load for an average of one year of rock-breaking service.

The C-210's used on these V-sheave to flat-surface drives, like all of the approximately 250 "U. S." belts in 48 different sizes used throughout the Bethayres plant, have a built-in advantage. "Balanced driving power"... the result of specially developed manufacturing equipment that automatically controls weight, dimensions, density, length, and tension members... helps provide a uniformity, toughness, length stability and true-running smoothness that have paid off in job after job, plant after plant the nation over.

Put balanced driving power to work in your own operations. See your "U. S." Power Transmission Distributor for full stocks and expert service.

U. S. Royal V-Belts and engineering assistance for these drives supplied by "U. S." Distributor Lindsay-Oberholzer of Philadelphia, Pa.

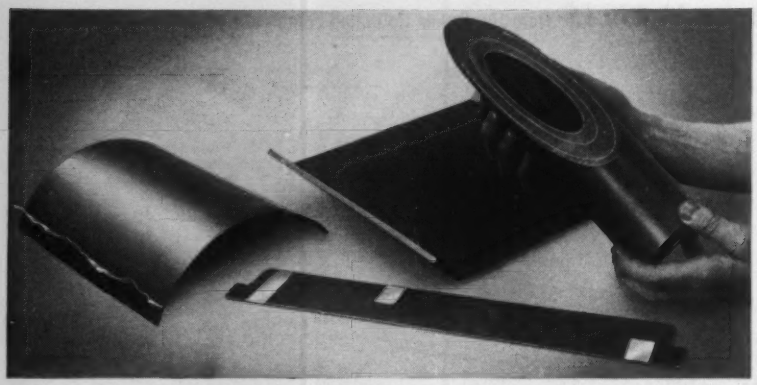
Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Important facts to know about laminated plastics



A few Taylor composite laminates (left to right): copper-clad section; sandwiched copper component; Taylorite vulcanized fibre-clad part; laminated tube, copper inserts.

Composite Laminates Open Up New Design Opportunities

While the great variety of commercially available laminated plastics satisfy most electrical and mechanical requirements, there are applications that can benefit from the combination of properties provided by composite laminates. Recent advances in bonding techniques have made it possible to bond virtually any compatible material with a laminate. These can be supplied as clad or as sandwiched materials. And they can be molded into many shapes to fit design requirements. Taylor is presently supplying to order the following composite laminates:

- **Copper and laminated plastics.** Clad for printed circuits and formed shapes. Sandwiched for special applications.
- **Taylorite® vulcanized fibre-clad laminates.** These combine the high strength of laminated plastics with the superior hot-arc-resistance of vulcanized fibre. They are being used in both high and low-voltage switchgear applications. Also in applications where the high impact strength of vulcanized fibre may be advantageous.
- **Rubber-clad laminates.** Almost any type of natural or synthetic rubber may be used as the cladding material. These laminates are widely used for condenser tops in wet condensers to protect the laminate against highly alkaline electrolytes. They also have application in any part where sealing or chemical resistance is needed.
- **Asbestos-clad laminates.** For applications where high heat- and arc-resistance are required.
- **Laminate-clad lead.** Lead sheets sandwiched between Grade XX paper-base laminates have been used for X-ray shields. The laminate provides strength and contributes to the high shielding properties of the lead.
- **Aluminum-clad laminates.** These have been used extensively for engraving stock. They also offer possibilities as printed-circuit material and as plate holders for X-ray machines.
- **Beryllium copper-clad laminates.** Beryllium copper is nonmagnetic and a good conductor—properties that give these laminates possibilities in many applications.
- **Stainless steel-clad laminates.** Applications where nonmagnetic properties are required. Also in certain corrosive environments where the resistance of stainless steel to attack is an asset.
- **Magnesium-clad laminates.** These laminates have been produced in 108-in.-long sheets for use as screens for X-ray operators. Weight was a factor.

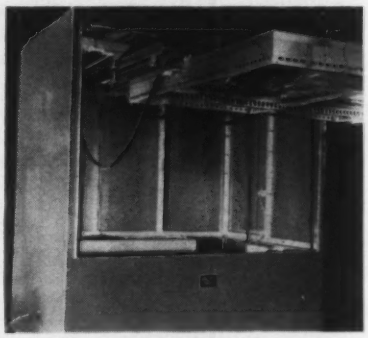
Our design and production engineers are constantly developing new materials, new applications, and new procedures for fabricating laminated plastics. Our experience is yours for the asking. And if you have a problem requiring assistance or more information on composite laminates, write us. Also ask for your copy of Taylor's new guide to simplified selection of laminated plastics. Taylor Fibre Co., Norristown 52, Pa.

Taylor
LAMINATED PLASTICS VULCANIZED FIBRE

NEW EQUIPMENT

Portable Heater

A portable radiant heater raises metals to forming temperatures, right at the drop hammer or press. These metals may be titanium, Inconel, or magnesium, as well as their alloys. Use of this heater eliminates rejects that result when metal ductility is weakened, through heat loss during transfer of blanks from remote oven to forming facility. A gold-plated, retractable

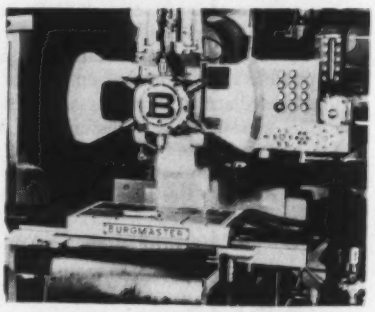


lamp head delivers temperatures to 1500°F at the forming block. It does away with the need to heat soak, and possibly contaminate, blanks to compensate for oven transfer losses in temperature. The lamp head can be raised or lowered, extended and retracted over workpiece. Fan cooling protects against overheating. (The Electric Hotpack Co., Inc.)

For more data circle No. 56 on postcard, p. 175

Turret Drills

Through the use of a four-speed motor, automatic turret drills offer a selection of eight individual



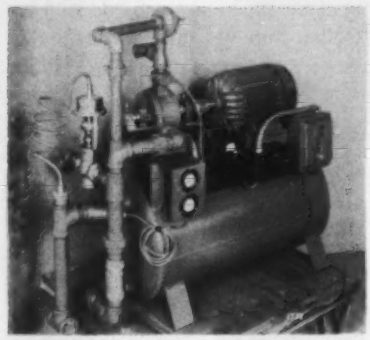
speeds, in any of four speed ranges per each spindle. The wider range of speed selections for each spindle, facilitates operation at the most

efficient machining speed — from slow spindle revolutions per minute required for tapping and for large tools, to high revolutions per minute best suited for small diameter, high-speed drilling and boring operations. (Burg Tool Mfg. Co., Inc.)

For more data circle No. 57 on postcard, p. 175

Water Economizer

For all induction-heating equipment, a self-contained water recirculating system contains an electro-magnetic device to control formation of scale and corrosion. Temperature of the water may be controlled at any setting in the range from 75° to 150°F. A dial-type thermometer indicates the temperature of the circulating water.



The amount of water that can be saved depends upon water supply temperature and the maximum allowable temperature of cooled equipment. Pressure in the system is automatically fixed by an adjustable pressure regulator on the output side of the pump. (Induction Heating Corp.)

For more data circle No. 58 on postcard, p. 175

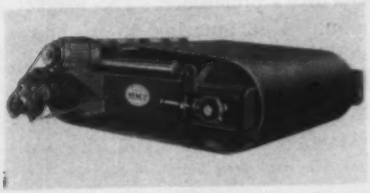
Wire-Drawing Machine

A vertical double-deck wire-drawing machine with differential speed compensation has a great advantage over conventional machines equipped with a rigid double-deck capstan. In the new unit both sections of the capstan can operate without slip. This is of great importance when drawing sensitive material or if different reductions are used. The differential drive automatically selects the optimum speed ratio of the capstans for any given drawing conditions. Equilibrium is provided by the wire which is subject to back-pull. The drawn wire is free of torsion stresses. (Malmedie & Co.)

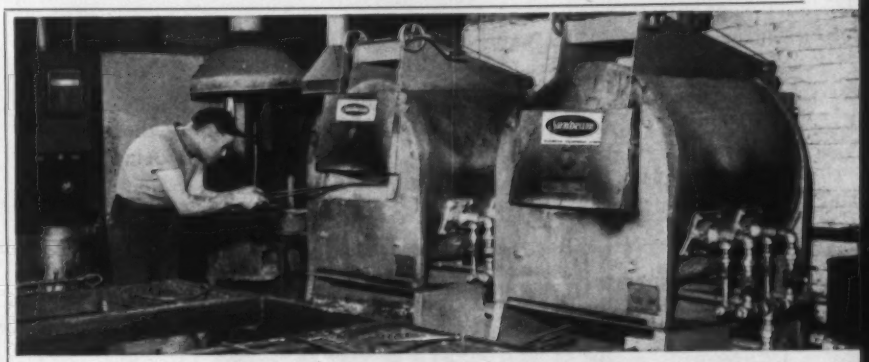
For more data circle No. 59 on postcard, p. 175

Tramp-Iron Removal

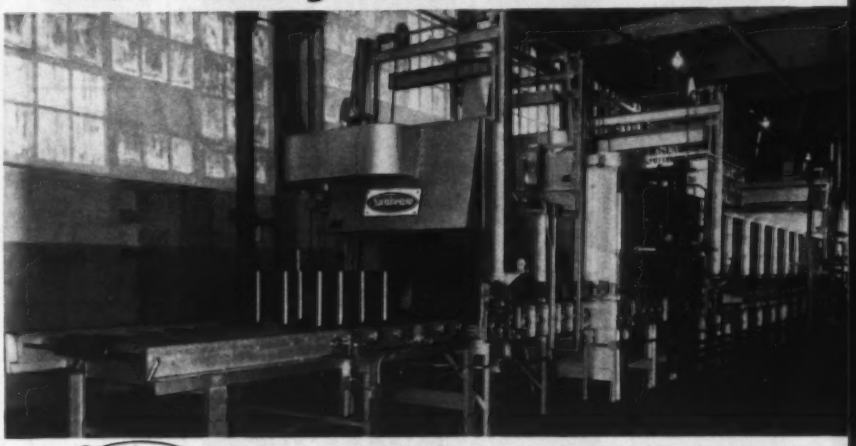
At greatly increased efficiency, tramp iron and iron-bearing slag can be removed from the raw, crushed slag feed. A typical installation incorporates an extremely powerful self-cleaning, oil-filled and oil-cooled, rectangular double-gap suspended magnet, arranged for cross-belt operation. The unit is complete with reversible motor, so that iron and iron-bearing slag can



be discharged to either side of the main conveyor belt, according to



from wide range ovens . . . to roller hearths



Sunbeam makes the right furnace equipment for *every* heat processing need!

The need may be for a small Wide Range Oven to heat treat small parts over a broad temperature range. Or for a large Roller Hearth Furnace to heat process parts continuously.

Between these two examples, lie all kinds of requirements. To meet the broad range of needs, Sunbeam makes every type of furnace equipment for all industry—from a single furnace to an entire production line . . . with any degree of automation.

Whether you're planning for an expansion, building a new plant or replacing equipment . . . it will pay you to call in your near-by Sunbeam representative. He knows the performance possibilities of every furnace in the Sunbeam line . . . and, he knows what can be done with special furnace equipment. For more information write **Sunbeam Equipment Corporation, 200 Mercer Street, Meadville, Pennsylvania.**

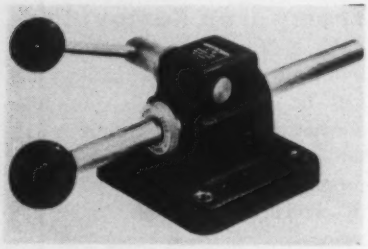
INDUSTRIAL Sunbeam FURNACES

the user's preference. The magnet, mounted an amazing 15 in. above the belt, removes tramp iron and iron-bearing slag. Magnets are available in all standard belt widths. (Magnetic Engineering & Mfg. Co.)

For more data circle No. 60 on postcard, p. 175

Jig Lock

Simplifying jig and fixture design, and eliminating special locking details, a jig lock incorporates the same automatic pressure control used exclusively on the company's vises. Simple turning of the control automatically adjusts the holding pressure from 1 up to 1500 lb. Easy hand pressure locks and holds



the rigid or non-rigid work in position, without distortion. There are no screw threads to wear, and no clamping and holding tools are required. The end of the hardened and micro-ground locking bar has been left soft, 1 in. from the end for easy machining to add to fixtures. (L-W Chuck Co.)

For more data circle No. 61 on postcard, p. 175

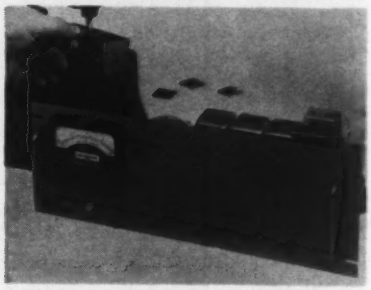
Pilot Punch

New pilot punches speed up pin removal and eliminate damage to pin or wall of holes. Also, pin may be driven completely through hole without sticking punch. Twelve sizes match all standard pin diameters and maximum lengths. (Mayhew Steel Products, Inc.)

For more data circle No. 62 on postcard, p. 175

Meter Relay

Anything that can be represented by an electrical signal is controllable by a Regohm meter relay. Signals as low as 2 microwatts will activate the relay; capable of controlling up to 600 w of output power. Prime application of the

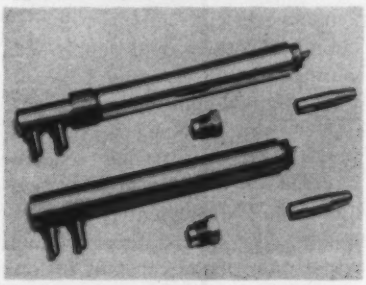


device is in the field of process control. The relay can sort, grade or classify, alarm, indicate or control. Operation is continuous, without the need for re-set circuitry. Physically, modular construction is employed. (Electric Regulator Corp.)

For more data circle No. 63 on postcard, p. 175

Tip Holders

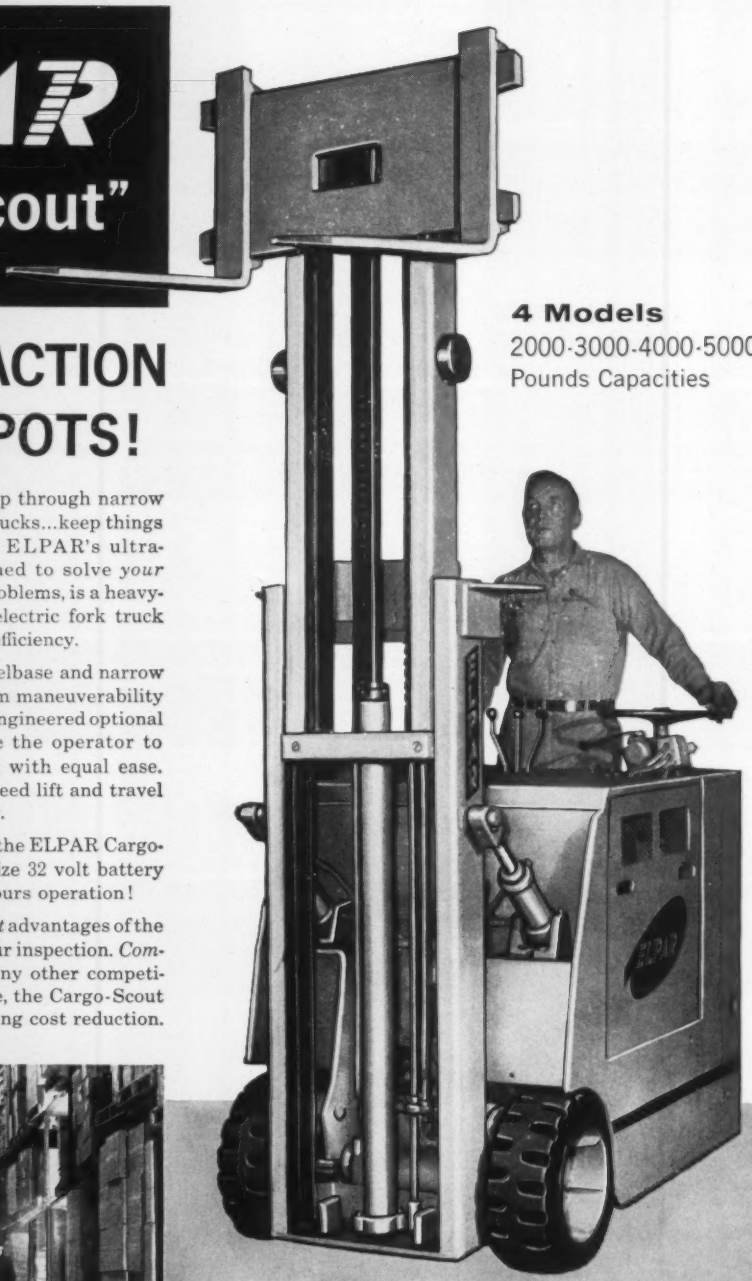
A line of straight, resistance-welding tip holders consists of two types — ejector and non-ejector.



The ejector type utilizes an entirely new method of tip ejection that is ruggedly built, and will not leak

where moisture
and abrasion
meet brightness
that never wears out
sink frames of
Superior
STAINLESS STRIP STEEL
At the toughest spot in the kitchen, Superior Stainless shows its metal best . . . the ever-bright, smooth gleam that asks no more than a wipe to reflect a housewife's pride. • Solid Superior stainless sink frames fabricate uniformly well because composition, dimensions and temper are uniformly as specified, every time. • We can serve you exactly as you wish. Ask us!
SUPERIOR STEEL DIVISION
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA
For Export: Copperweld Steel International Company, New York

ELPAR "Cargo-Scout"



4 Models
2000-3000-4000-5000
Pounds Capacities

...For FAST ACTION in TIGHT SPOTS!

Here's a fast truck built to slip through narrow aisles...load freight cars and trucks...keep things moving on crowded docks. ELPAR's ultra-compact Cargo-Scout, designed to solve *your* trickiest material handling problems, is a heavy-duty, stand-up, end-control electric fork truck built for speed and handling efficiency.

The Cargo-Scout's short wheelbase and narrow overall width assure maximum maneuverability in conjested areas. Its safety-engineered optional hand or foot controls enable the operator to drive forward or backward with equal ease. Fast acceleration and high speed lift and travel assure maximum productivity.

Although small and compact, the ELPAR Cargo-Scout accommodates a full-size 32 volt battery — power packed for a full 8 hours operation!

Dozens of other *user-important* advantages of the ELPAR Cargo-Scout await your inspection. *Compare* the Cargo-Scout with any other competitive truck. Feature by feature, the Cargo-Scout adds up to *substantial* handling cost reduction.

This "Cargo Scout" is used for narrow aisle stacking at the distribution center of the Stop & Save Trading Stamp Corporation, a wholly-owned subsidiary of The Grand Union Company.

You can LEASE a Cargo-Scout under the flexible, low-cost ELPAR lease plan.

Send for this Cargo-Scout catalog today!

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THE **ELWELL-PARKER** ELECTRIC COMPANY
4294 ST. CLAIR AVE • CLEVELAND 3, OHIO
In Canada: International Equipment Company, Ltd.

Leading producer of electric powered fork, platform and crane trucks

coolant water. Both types of holders use adapters to take the brunt of the wear (in the tip socket), and to permit interchangeability of tip size by simply changing adapters. Adapters with four different tip socket sizes are made to accommodate all current tip sizes. (Air Reduction Sales Co.)

For more data circle No. 64 on postcard, p. 175

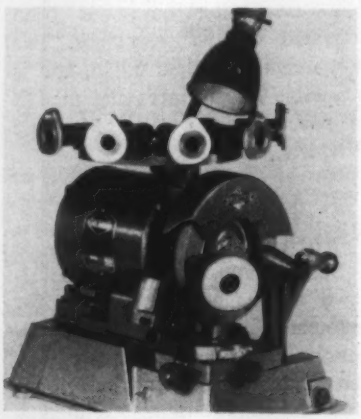
Chipless Tapping

By fluting a tap, contact area has been reduced, thereby lessening drag and reducing driving torque. The fluted tap forms threads without chips. Effective lubrication is realized through the fluting allowing the lubricant to move directly to the forming area. The increased lubrication is said to lengthen tap life, provide smoother threads, and allows the same tapping equipment used for standard taps of equivalent size to be employed. (Jarvis Corp.)

For more data circle No. 65 on postcard, p. 175

Drill Grinder

Featuring longer life and better performance, a drill grinder has a stand, with etched plate marked in increments and mounted on a dovetail slide. This permits the entire grinding wheel to be utilized. A new turret-type, quadrant swings



the desired drill locator in direct line with the swinging arm of the grinder, resulting in easier, faster operation. Diamonds in wheel dressers are presented to grinding wheel at 15° angle for self sharpening. A mist coolant is provided for improved finish, and longer wheel life. (Edward Blake Co., Inc.)

For more data circle No. 66 on postcard, p. 175

Platform-Pole Trailer

To eliminate idle and seldom-used equipment, a multi-purpose extensible trailer combines into one unit the features and functions of two trailers—a pole trailer and platform trailer. This overcomes the capital outlay, registration, insurance and maintenance costs usually expended on infrequently used equipment. The combination platform-pole trailer is basically a platform trailer for the normal hauling of flat loads, and is available at little more than the price of one flat-bed. However, the trailer is easily adjustable to a full length pole trailer of 55 ft. (Atlas Trailer Mfg. Corp.)

For more data circle No. 67 on postcard, p. 175

Rust Dissolver

Easily applied, manganesed-phospholene dissolves rust, and combines chemically with metal surfaces to form a rust-inhibiting coating. Paint, lacquer, enamel, plating (or any protective coating) anchors securely to the treated metal and will not peel off. An occasional painting or spraying with the new product will protect valuable machinery and equipment, and save the expense of costly replacements. The manganesed-phospholene can be used on instruments, tools; for marine service, structural steel, for stampings, wire and screw machine products. (Western Reserve Laboratories)

For more data circle No. 68 on postcard, p. 175

Work Base

Special tests of wire, ceramics, adhesives, steel, plastics, rubber, and springs, often require bulky gripping and related instrument accessories. A new expandable work platform permits the proper set-up of this equipment by expanding the normal work area almost three times. Portable and easy to install, it facilitates almost unlimited tests of tensile, compression, transverse and shear loadings. The tester is 0- to 10,000-lb capacity, and is also available in 0- to 250-, 0- to 500-,

STRAITS TIN REPORT

News of developments in the production and uses of tin

MALAYAN TIN BUREAU

Rubber tin—A tin compound that stretches like rubber and can be vulcanized has been developed by the Army. Tin is substituted for carbon, the usual base of rubber. The new polymer, alkyl tin methacrylate, is a "stretchable" high-temperature material with greater resistance to chemical fuel than conventional rubber. This may lead to a series of carbon-replacement materials similar to boron chemical fuels.

New tinplate that is lighter, stronger and thinner than any ever made is being researched by major steel producers. It shows great promise and is expected to offer important economic advantages to canners and other tin plate users, for shipping and product protection. No change in tin content of the new plate is indicated.

Nonspattering flux is the result of experiments by Tin Research Institute. The new soldering process uses polyethylene glycol instead of acidified water as a vehicle for acid fluxes. It has a low boiling point—flux won't spatter when it contacts molten solder or soldering bit. Spreads smoothly over large area. Won't rust or corrode; residue washes off easily. Low volatility prevents evaporation; high flashpoint eliminates fire risk. No unpleasant odors or harmful fumes.

Write today for more data on these items or for a free subscription to TIN NEWS—a monthly bulletin on tin supply, prices and new uses.

The Malayan Tin Bureau
Dept. 54E, 2000 K Street, N.W., Washington 6, D.C.

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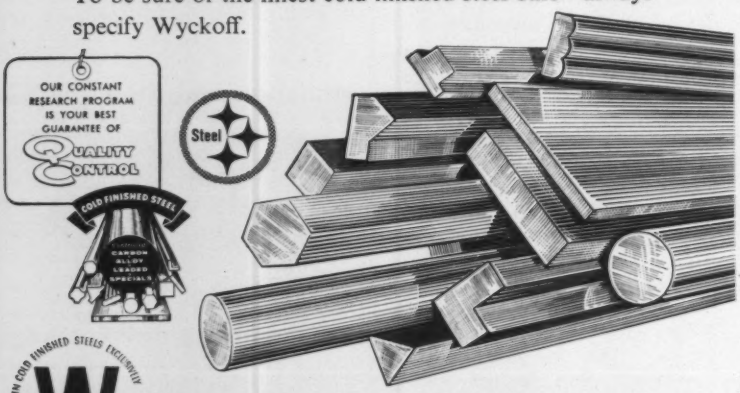
with years of experience and know-how in maintaining diversified stocks of all types of cold finished steel bars. He can reduce the cost of your in-plant inventories by making quick deliveries for your production demands. To be sure of the finest cold finished steel bars—always specify Wyckoff.


OUR CONSTANT RESEARCH PROGRAM IS YOUR BEST GUARANTEE OF QUALITY CONTROL
COLD FINISHED STEEL
CARBON ALLOY LEADED SPECIALS
Steel

SPECIALISTS IN COLD FINISHED STEELS EXCLUSIVELY

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WYCKOFF STEEL PRODUCTS
Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¾" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

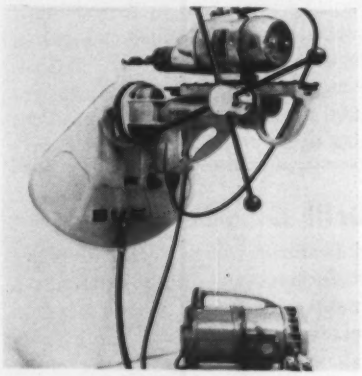
NEW EQUIPMENT

0- to 1000-, 0- to 2500-, 0- to 5000- and 0- to 7500-lb capacity. The testers are hand operated, or may be ordered motorized in four standard sizes with daylight openings of 13, 20, 30 and 40 in. (W. C. Dillon & Co., Inc.)

For more data circle No. 69 on postcard, p. 175

Drill Stand

Operated by means of a portable vacuum base, a portable drill stand fastens itself with up to 3000-lb holding force, to any nonferrous material for quick and easy drilling. The stand has radial positioner which provides freedom to rotate drill point a full 190° about the



vacuum base; with lateral movement up to 1⅛ in. for accurate positioning after base has been activated on the workpiece. The unit weighs less than 65 lb, and is adaptable to all makes and models of portable drills. (Bux Magnetic Products, Inc.)

For more data circle No. 70 on postcard, p. 175

Pickup Units

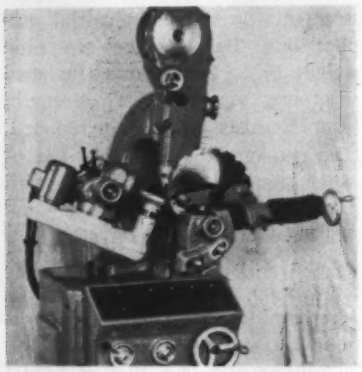
Sub-miniature pickups, developed as a monitoring device for automation and production applications, are adapted for use with the company's miniature relay control amplifiers. These amplifiers provide adjustable controls for both sensitivity and light strength. Positive adjustment of operation on narrow thresholds of light values is possible. In addition to reduction in size, the units can be standardized on a whole range of appli-

cations. These pickup units are designed for quick and rigid mounting, resulting in engineering, installation and maintenance reduced to a minimum. (Photomation, Inc.)

For more data circle No. 71 on postcard, p. 175

Saw-Grinding Machines

Widely used in Europe, a complete line of automatic saw-grinding machines is available in several models. It takes 12 minutes without an operator's attention to resharpen



a carbide-tipped saw blade of 14-in. diam with 42 teeth, straight-tooth face and alternate top-bevel of 15°. (W. Von Arnauld Co.)

For more data circle No. 72 on postcard, p. 175

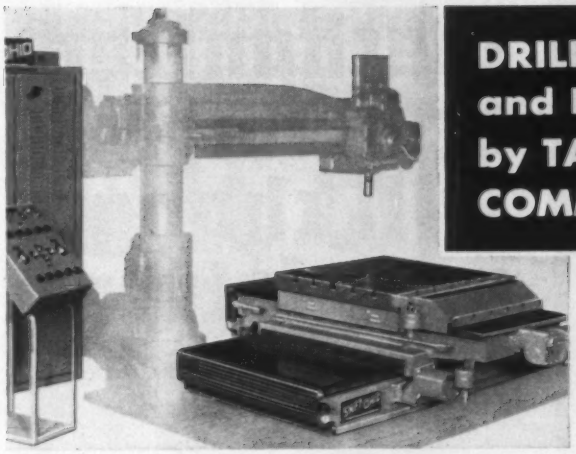
Carboloy Inserts

Pre-honed, disposable carboloy inserts have about 35-pct longer predictable tool life than unhoned inserts. Pre-honing makes it possible to use harder, more durable grades. Grades formerly only used on finishing may be used in semi-finishing when pre-honed. Pre-honed inserts also cost less than unhoned inserts plus hand honing. Each edge of each insert is honed to a uniform radius which varies according to the service. (General Electric Co.)

For more data circle No. 73 on postcard, p. 175

Electrical Machining

A major advance in the field of electrical-discharge machining allows a metal-removal rate of 20 cu in. per hour. One of the salient factors in this vastly improved metal-removal rate is aluminum elec-



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Handles drilling thrusts of 5000 lbs. Traverse rate is 150 in. per minute. Deflection, with work load, is .001 in. Absolute accuracy on drilled hole location is .0015 in.

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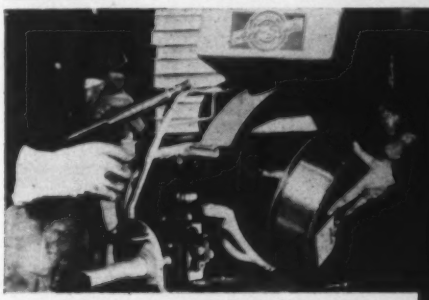

Loading 10 lb. spool of #4043 aluminum wire at Michael Flynn Manufacturing Co., Philadelphia. Aluminum in this particular spool was used in welding curtain walls for skyscraper at 2 Broadway, New York City.

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SPOOLED ALUMINUM

in all grades, all types precision layer level wound on 1 lb. and 10 lb. spools

Wire goes from extrusion and light draw to ALL-STATE'S precision spooling machines where it is layer level wound for smooth, trouble-free welds.

Types available: 1100, 4043, 5052, 5154, 5183, 5356, 5556, 6061, 6063, *355,* 356, 716, 718.

Precision spooled in these sizes: .030, .040, 3/64, 1/16, 3/32, 1/8.
*down to 1/16 only

ALL-STATE *Spoolarc*® spooled aluminum wire meets federal and industry specifications. Spools are sealed in polyethylene bags plus desiccant to retain top quality from spooling machine to welding machine.

Complete stocks available from factories at White Plains, N. Y. and South Gate, California . . . and from branches at St. Louis, Missouri and Toronto, Canada. On sale at over 1000 distributors here and abroad.

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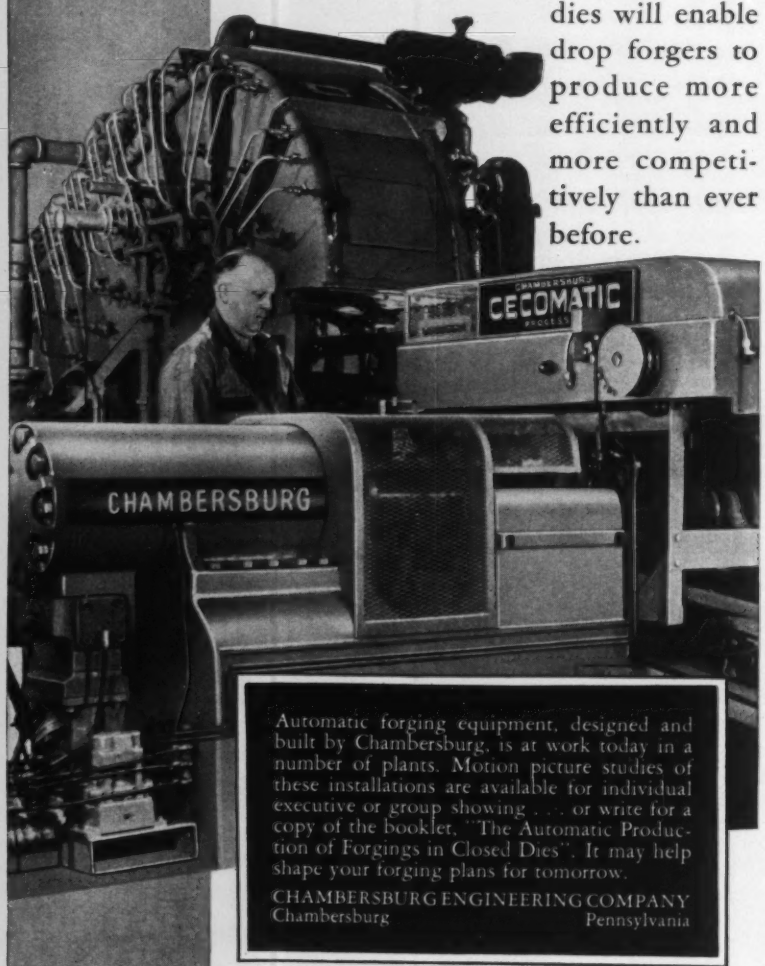
Mechanized drop forging will change your future!

The cost-cutting advantages of the automatic production of forgings in closed dies will enable drop forgers to produce more efficiently and more competitively than ever before.



Automatic forging equipment, designed and built by Chambersburg, is at work today in a number of plants. Motion picture studies of these installations are available for individual executive or group showing . . . or write for a copy of the booklet, "The Automatic Production of Forgings in Closed Dies". It may help shape your forging plans for tomorrow.

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DESIGNERS AND MANUFACTURERS OF THE IMPACTER

When it's a vital part, design it to be FORGED

trodes which have a vastly increased wear ratio. Normal wear ratio approximates a 3 to 1 end wear—but the aluminum electrodes have between 20 to 50 to 1 end wear. (Elox Corp. of Michigan)

For more data circle No. 74 on postcard, p. 175

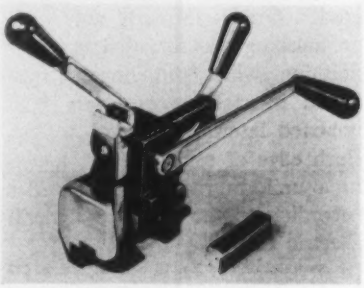
Cord Strapping

Made of high-tenacity rayon cord, a cord strapping has ample strength for many industrial applications. Because the strapping weighs ¼ to 1/7 as much as steel strapping, of comparable strength, shipping costs are greatly reduced. Easy to handle, the coils of cord weigh about 21 lb, complete with disposable spool, in a yardage equal to a 100-lb coil of steel strap. There are no sharp edges on the cord, so there is no danger of cut hands or other accident in packaging operations. (American Viscose Corp.)

For more data circle No. 75 on postcard, p. 175

Strapping Tool

Combining tensioning, automatic placement of seals, and sealing and scoring of steel strap, a strapping tool handles ½- and ⅝-in. strap, in gages of 0.015 to 0.023 in. It holds 50 seals in a clip-type magazine. Seals are automatically fed onto the tensioned strap, so that one motion crimps the seal and scores



the strap for easy break-off. A continuous take-up on the unit permits feeding strap directly from a coil. Made of high-strength steel, the stretcher-sealer has been designed for long service under rugged operating conditions. (A. J. Gerrard & Co.)

For more data circle No. 76 on postcard, p. 175

NEW FILMS

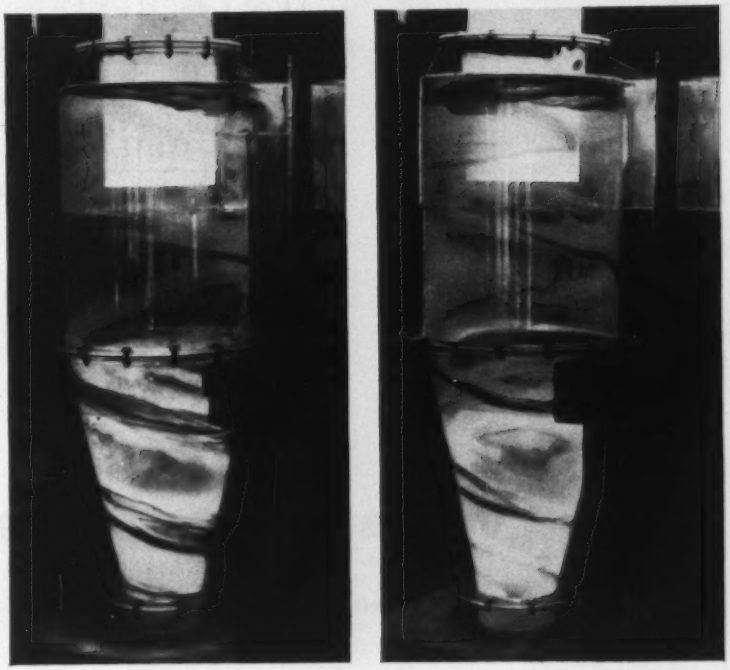
"Automatic Drill Point Grinder" shows the Model 100 Winslo-Matic drill grinder in operation. The machine produces various types of drill points with a sharpening capacity from 1/32 to 1½ in. This machine produces ultra-precision points at high production rates. 10 min. 16mm, color, sound. Winslow Product Engineering Corp., 47 St. Joseph St., Arcadia, Calif.

"Architectural Aluminum" combines humor and music while reviewing finishing, fabrication, and installation of the architectural aluminum. The film will be loaned to groups of architects, students, merchants, and others concerned with design, construction, and remodeling of commercial buildings. 17 min., color. The American Art Metals Co., P. O. Box 7188, Station "C", Atlanta 9, Ga.

"A Letter to Moscow" answers challenges voiced by Soviet Premier Nikita Khrushchev during his visit to the United States in 1959. The film illustrates how the nation's competitive enterprise system contributed to the high standard of living realized by the American people. The film traces the growth of a typical American company, and shows how it was able to develop and prosper in our free society. 28 min., color, sound, 16 mm. Armstrong Cork Co., Lancaster, Pa.

"Conveyors for Parts, Assemblies and Packages" shows the progress of conveyors from 1912 to today's highly automatic industries. Conveyor applications in a wide variety of warehousing operations are featured. Among the conveyor systems presented and described in the film are trolley, floor, gravity, free roll, endless belt, slat, and many others. 16mm, color, sound. Cinema Dept., University of Southern California, Los Angeles 7.

UNRETOUCHED ACTION PHOTOS PROVE SUPERIOR PERFORMANCE OF BUELL CYCLONES



BUELL CYCLONE with Shave-Off — an ordinary cyclone

These are photographs of as true a test as can be made under laboratory conditions. Notice the difference in the dust patterns! In the Buell Cyclone, on the left, the dust at the top makes less than one revolution before it is trapped by the Shave-Off. It's then channeled down to the lower portion of the Cyclone, well below the clean gas outlet.

Why is the Buell Shave-Off so effective? Primarily because it harnesses the double-eddy current to convey the dust "fines" downward quickly, thereby promoting greatly increased efficiencies. In the ordinary cyclone, as shown on the right, these "fines" concentrate and recirculate at the top, causing erosion of the cyclone. To be collected, the fine dust must travel downward close to the clean gas outlet where much of it escapes. Buell Cyclones have made an impressive record in many years of trouble-free service. To see how their extra efficiency in the Shave-Off can pay off for you, send for our Cyclone Catalog #103. The Buell Engineering Co., Inc., 123 William Street, New York 38, New York. Northern Blower Division, 6404 Barberton Avenue, Cleveland, Ohio. (Subsidiary: Ambuco Ltd., London, England.)

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The Iron Age Summary

Price Hike Prospects Lessen

There's little chance for steel price increases in the foreseeable future.

Competition from imports and the low level of incoming orders have reduced pressures to raise prices.

■ Even wishful thinking on steel price increases has disappeared—for the foreseeable future.

A flurry of steel price cuts in recent weeks gives evidence of the collapse of pressures supporting demands for higher prices in the near future.

However, there is no evidence of a softening in major mill prices for regular steel products. The price weaknesses are selective. But they do bring out into the open those market conditions which have prevailed for some time in certain areas.

Competition from Imports — In most cases the weakness involves warehouse material, reinforcing bars for concrete construction, and specialty steel products.

Heavy imports of reinforcing bars at Atlantic Coast ports have contributed weakness in this area. This is especially true of the Florida market which took more than 50 pct of the 25,000 tons of reinforcing bars to pass through East Coast ports in February.

To combat the imports, a leading steelmaker in the South has cut its regular mill price for this product by $8.50 a ton. As yet, the price weakness had not moved north. But there are reports of a price cut by a mill serving the Southwest. And imported reinforcing bars are said to be "sold out" for the third quarter in the East.

Stainless and Specialties—There is some softness in warehouse prices for stainless steel in the East and Far West. It is believed that this material is affected by warehouse competition from foreign items.

In addition, several steel mills have just announced price cuts for some specialty steel items. Most significant of these has been a 13 pct reduction in the base prices of forging billets for vacuum melted, high-strength, low-alloy steels.

Demand Affects Prices — But comparable reductions also have been made in vacuum melted, low-alloy sheet, wire and bar products. These materials are used primarily in the areospace industry for missiles. A competitive domestic market is developing as greater volume and experience are gained.

Low level of demand for carbon steel products acts as an effective deterrant to higher prices for this group. The lower volume of incoming steel orders in the past month will soon usher in seasonal declines of "more than moderate" nature in steel production and shipments.

Summer Slack—June, July and part of August are normally slow months in steel — except in the midst of a boom condition.

However, the steel industry looks for a relatively strong seasonal pickup beginning early in September. Part of the expected improvement will come from automakers and their suppliers.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,042	2,102	2,238	2,644
Ingot Index				
(1947-1949=100)	127.1	130.9	139.3	164.6
Operating Rates				
North East Coast	75.0	77.0*	79.0	92.0
Buffalo	76.0	77.0*	84.0	101.0
Pittsburgh	72.0	75.0	79.0	94.0
Youngstown	45.0	50.0	63.0	86.0
Cleveland	79.0	78.0*	87.0	94.0
Detroit	95.0	99.0*	83.0	99.0
Chicago	73.0	76.0*	84.0	93.0
Cincinnati	81.0	88.0*	92.0	86.0
St. Louis	85.0	80.0*	84.0	102.0
South	72.0	73.0*	79.0	93.0
West	70.0	70.0*	70.0	98.0
U. S. Rate	71.7	73.8	78.5	93.4

*Revised
Source: American Iron And Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$33.17	$33.17	$33.50	$34.17
No. 2 bundles	$23.17	$23.17	$22.83	23.50
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	26.80
Copper, electrolytic	33.00	33.00	33.00	31.50
Lead, St. Louis	11.80	11.80	11.80	11.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	99.50†	99.00	99.00	103.50
Zinc, E. St. Louis	13.00	13.00	13.00	11.00

Leasing Leads to More Business

Industrial truckmakers are leasing more and more equipment and finding that it pays.

Both long and short term leases are fast becoming popular with users.

■ Industrial truckmakers report business this year is running well ahead of 1959. But not enough to strain their capacities.

Generally, most standard electric lift trucks are ready to ship to a customer within four weeks of the actual order. Standard gasoline models take one to two weeks.

Stockpiling — Some makers say they are starting to stock the most popular models, and can ship these immediately. Others maintain good stocks of components and say they can put an order together in a matter of days.

But, not all orders for lift trucks are buying orders these days. There is a growing trend toward leasing. The most popular plan, says a spokesman for one major industrial truckmaker, is guaranteed maintenance with no option to buy.

Why It's Good—The advantages of this, the spokesman notes, are: Maintenance is by factory trained and experienced mechanics; expenses are tax deductible; and they are negotiated in advance for the entire period of the contract. Also, in some cases it avoids tying up much needed capital.

Most leases, with no option to buy, run three to five years.

There is also a trend toward weekly and monthly rental of equipment. These customers are usually companies with sharp peaks and valleys in the volume of material handling they do. They report this approach is by far the most economical.

More Variety—Industrial truckmakers are responding by making a wider range of equipment available for short term renting. This is one way they put equipment taken in trade and reconditioned back to work. But, more and more rented equipment is new.

In addition to their taking older models in trade, industrial truckmakers are making styling changes. There is a definite move toward streamlined appearing equipment.

"We are rounding off the corners, making them more colorful, and generally trying to brighten up their overall appearance," says a representative of a major lift truckmaker.

Little Change—But the industrial truckmakers still aren't changing models from year-to-year. Actually, based on performance, the lift trucks on the market today aren't much different from those of two years ago.

Export of industrial trucks is also growing. The principal export market in the last few years has been South America.

Exports Up—A spokesman for the export arm of one company calls business this year "better" than 1959, and says 1959 was "much better" than 1958. This includes parts, which are usually sent to franchised dealers in the foreign country for installation and service.

This spokesman sees a steady growth in export business. "That is," he says, "if some of the countries don't change their import duties. In some cases these run as high as 300 pct. If they ever knock these down, export business would skyrocket. We'd be hard put to meet the demand."

GROWING TREND: Industrial truckmakers are now leasing trucks like this one, and finding users really like the system.

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The Difference

You Can
WORK
The Difference

You Can
HAVE
The Difference
AT NO EXTRA
COST

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If you haven't made a comparison run against ordinary cold finished steel bars with clear, bright Bliss & Laughlin Lusterized Finish bars, you will be impressed with the difference.

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Lusterized Finish is a Bliss & Laughlin exclusive. It is another result of a constant research program over nearly 70 years to produce cold finished steel bars that will improve your production and profits. Ask for a new folder detailing the production advantages of specifying Bliss & Laughlin Lusterized bars.

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Leading Independent Producer of Cold Finished Steel Bars

Sales Competition Brings Price Cuts

Atlantic Steel cuts reinforcing bar prices $8.50 a ton in move to fight imports.

Producers of vacuum melted, high-strength, low-alloy steels also announced reductions.

■ Sales competition—both domestic and foreign—is bringing price reductions.

For two products, reinforcing bar and vacuum melted alloy steels, the pressure resulted in base price cuts last week.

Atlantic Steel Co., Atlanta, Ga., made a reduction of $8.50 a ton in reinforcing bar. Prime motive of the cut was an attempt to reduce sales lost to imported re-bar. "Our prices are now within shouting distance of most imported re-bar prices," a company spokesman told The IRON AGE.

(Last March Atlantic dropped its base prices on bright common nails 15 pct to fight imports. Atlantic officials say the move improved sales for these grades of nails and others as well.)

U. S. Steel's Tennessee Coal & Iron Div. has not yet announced any reduction in reinforcing bar prices at its Fairfield, Ala. basing point.

Alloy Prices Reduced—A 13 pct reduction in the price of forging billets of vacuum melted, high-strength, low-alloy steel was first announced by Universal-Cyclops Steel Corp., Bridgeville, Pa. At the same time, the company also cut the price of vacuum melted, low-alloy sheet, wire and bar. The reduction was in the same range as the 11¢ a lb cut for the billets.

Two other producers also announced changes. Crucible Steel Co. of America, Pittsburgh, said it would meet the new prices on most, but not all grades. The company noted it was cutting the price on its Ladish D-6 grade from 85¢ a lb to 74¢ a lb.

Allegheny Ludlum Steel Corp., Pittsburgh, said it would be competitive on the new prices. Earlier A-L had cut the price on its A-286 bars, wire, sheet, and cold-rolled strip. (A-286 is a high temperature alloy which is normally vacuum melted.)

The high-strength, low-alloy steels are finding greater use in the aerospace industries, especially for missile work. Producers say there has been active price competition in the vacuum melting field. This was apparently a factor in the price cuts. However, larger sales volume and greater experience has improved product yields, lowered processing costs.

Sheet and Strip—Mills are still getting cancellations and deferments from buyers. Apparently users are still digesting first quarter shipments and buying only to fill inventory holes. Sheet mills at **Pittsburgh** predict a steady decline in production during June and July. One of the prime reasons will be the falloff in auto steel orders in the model changeover period.

A mill at **Detroit** says some May orders included stock for 1961 auto models. About the same amount will go for 1961 models on June orders, the company says, But a larger percentage should be taken in July. Another mill says June orders show a good increase over those of May. **Chicago** area mills expect to offer sheet deliveries in three weeks during the rest of the first half.

Galvanized — Galvanized sheet demand continues to level off. Some sheet from the **Southwest** is being offered in **Midwest** markets. One **Chicago** area mill—which formerly expected to be sold out into August—is now offering June delivery.

Tinplate — Mill shipments are slow, but this is described as the normal seasonal lag. Canmakers are currently trying to hold tinplate inventories down. Tin mill production should taper off in the third quarter. But mills are still confident sales for the full year will set new records.

Plates and Shapes—There is no snap in this product area. Demand for wide flange beams is holding up fairly well, especially in the **Midwest.** But other heavy steel products are lagging badly. Warehouses in the **Pittsburgh** area are not buying plates in any quantity. At **Chicago,** sales offices are discouraged by the amount of structural orders.

There was a recent flurry of heavy steel buying there by fabricators and warehouses. However, it was apparently to fill inventory holes. In any event, the tonnage was not great.

Pipe and Tubing—May pipe orders for a **Pittsburgh** mill were up a little over last year's levels. But the gain was too slight to establish a trend. In the **Midwest,** buyers of oil country goods say they'll hold down purchases until the third quarter.

PURCHASING AGENT'S CHECKLIST

Starting in 1961 one agency will handle bulk of metals buying for all the armed forces. P. 109

Railroads slash some freight rates on pig iron in battle for business with Lakes boats P. 116

Make or buy decision on screw machine products requires careful study, new report shows. P. 117

COMPARISON OF PRICES

(Effective May 17, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	May 17 1960	May 10 1960	Apr. 19 1960	May 19 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	May 17 1960	May 10 1960	Apr. 19 1960	May 19 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$34.50	$34.50	$34.50	$37.50
No. 1 steel, Phila. area	34.50	34.50	34.50	33.50
No. 1 steel, Chicago	30.50	30.50	31.50	31.50
No. 1 bundles, Detroit	29.50	29.50	30.50	31.50
Low phos., Youngstown	36.50	36.50	36.50	38.50
No. 1 mach'y cast, Pittsburgh	50.50	50.50	50.50	49.50
No. 1 mach'y cast, Phila.	51.50	51.50	51.50	49.50
No. 1 mach'y cast, Chicago	51.50	51.50	52.50	54.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$33.17	$33.17	$33.50	$34.17
No. 2 bundles	23.17	23.17	22.83	23.50
Coke Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	$14.75-15.50	$14.75-15.50	$14.50-15.50
Foundry Coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	99.50†	99.00	99.00	103.50
Zinc, East St. Louis	13.00	13.00	13.00	11.00
Lead, St. Louis	11.80	11.80	11.80	11.80
Aluminum, virgin ingot	28.10	28.10	28.10	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

INDEX TO PRICE PAGES

Prices At a Glance 201
Comparison of Prices 205
Bars 214
Billets, Blooms and Slabs 212
Boiler Tubes 218
Clad Steel 218
Coke 217
Electrical Sheets 218
Electrodes 218
Electroplating Supplies 218
Fasteners 216
Ferroalloys*
Iron Ore 216
Merchant Wire Products 216
Metal Powders 218
Nonferrous
Mill Products 211
Primary Prices 205-210-211
Remelted Metals 211
Scrap 211
Piling 212
Pig Iron 216
Pipe and Tubing 217
Plates 214
Rails 218
Refractories 218
Service Center Prices 215
Shapes 212
Sheets 213
Spring Steel 218
Stainless 216
Steel Scrap 208
Strip 212
Structurals 212
Tinplate 213
Tool Steel 216
Track Supplies 218
Water Pipe Index 217
Wire 214
Wire Rod 213

* Appears in May 12 and May 26 issues.

800 to 1 hp favorites for quiet operation, low maintenance and long-life service . . .

From the case of the A. O. Smith Motor Man — a complete stable of integrals that include single-phase models (1-5 hp) or polyphase (1-800 hp). Also a team of fractional-hp motors. All are sure bets to give top performance over the long, long haul.

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Only Exports Firm In Dull Market

Reports from all over the country point to stagnant markets. Most used term is "listless."

Institute of Scrap Iron & Steel executive tells Castings group steel industry has out-researched scrap men.

■ Whatever firmness there is in the scrap market continues to be largely due to some strength in exports. Otherwise, a stagnant situation prevails throughout the country.

Research Needed—Some of the scrap industry's problems and hopes were sounded last week in a talk by William S. Story, assistant executive vice president, Institute of Scrap Iron & Steel. He told a group at the American Foundrymen's Society Castings Congress & Exposition, that "the scrap industry has been out-researched by the steel industry."

Said Mr. Story: "Major factors which impinge on the amount of scrap consumed include these innovations: An increase in blast furnace capacity, making more pig iron available; the increased use of oxygen in steelmaking using the oxygen lance; the charging of ore directly into the furnace, and the advent of a new steelmaking process —the oxygen converter."

However, Mr. Story pointed out that, "steps are being taken to bring scrap into a more favorable position." He cited the increasing attention of processors to other competitive aspects such as quality, delivery and special preparation for special customers. Also, he mentioned the increase of more efficient yard equipment that is able to give customers, "a cleaner, more uniform product in a form more readily usable by the industry's customers."

Pittsburgh—Prices of most grades are unchanged as the market shows a lack of demand at current prices. For grades that require preparation, there are signs prices are close to bottom. On a late list, the railroad withdrew its heavy melting when the top bid was under $39. Brokers are resisting a price at one mill of $26 for No. 2 bundles.

Chicago—Prices held firm in a dull market. Mills continue to make small purchases at existing prices, but volume of these purchases is low. Scrap continues to move out of the area, both for export and for use by U. S. mills in other areas. After a sluggish two weeks, cast markets appeared firmer at the beginning of this week.

Philadelphia—With the exception of export, the market is quiet. Domestic sales are at a standstill. Prices remain unchanged. The strongest sales area, except for export, is in foundry grades. Foundries are buying to meet orders for pressure pipe. Dealers and brokers see continued heavy export sales this month and next.

New York — Unless domestic buying picks up, and most dealers don't think this likely, there will be no change in the rate of activity here at least through June. There are enough ships loading steelmaking scrap for export to keep dealers busy until then. The stainless steel market, on the other hand, has sagged badly.

Detroit—Sales are still sluggish. A "what's the use" attitude seems to be creeping into the dealer outlook. Shipments to Canada are light. Rejections are reported plentiful on shipments across the border.

Cleveland—A very small buy of No. 1 heavy melting in the valley for $36 was the only activity in a stagnant market. Mills are taking a few cars at a time, and dealers are not pushing to sell. Foundries are equally slow, many working a three-day week.

St. Louis—The two biggest mills in this area have stopped buying. Scrap in dealers' hands continues to pile up. Mills that had built up inventories of scrap to operate at peak production have found orders for their finished products slow.

Cincinnati—Outlook is a continued small buying program next month with prices the same or slightly lower. Activity now is very slow with orders about filled for the month.

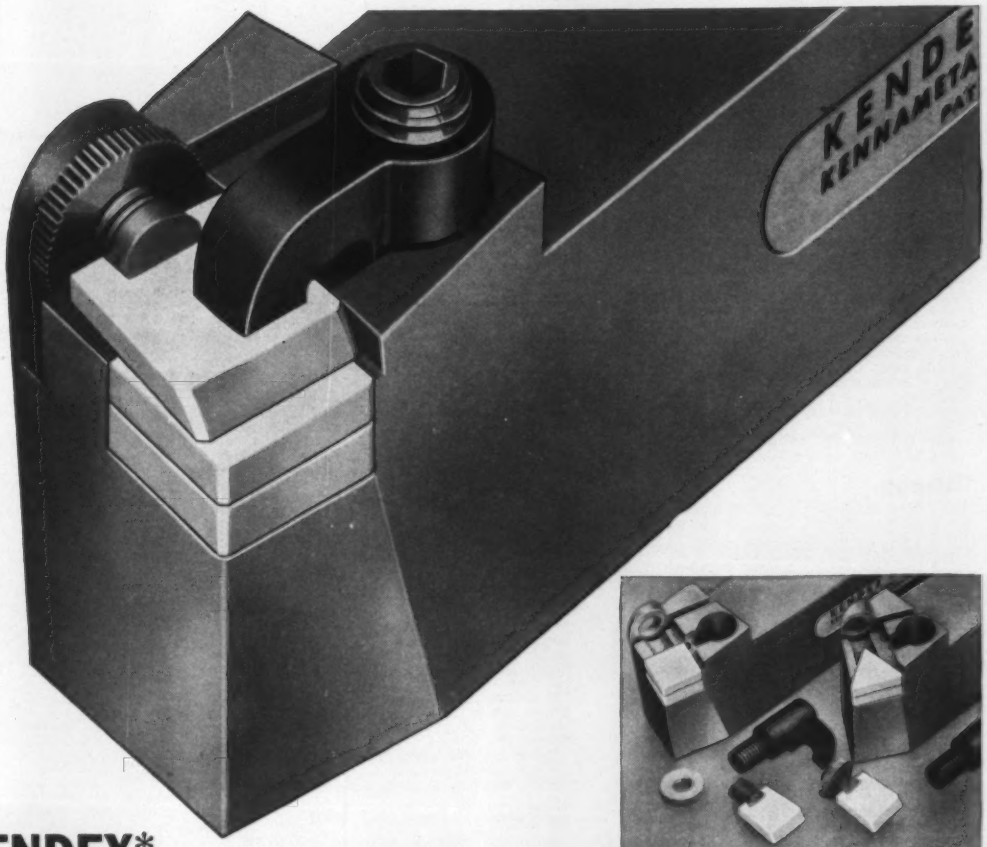
Birmingham — Cast iron scrap continues to move fairly well in this area at unchanged prices. Open hearth sales, however, are nonexistent. Dealers are working on limited electric furnace orders received earlier this month.

Buffalo — Inactivity has settled over the market here. The first cargo of scrap has been brought here via the Great Lakes. This has had no effect on prices, which remain unchanged.

Boston—Outlook: The situation remains unchanged — very dreary and dull. No. 2 heavy melting is down $2.

West Coast — A listless scrap market continues all along the Coast. The trade is gloomy on the immediate outlook. Exporting to Japan is expected to drop off next month. No. 1 cupola cast is in demand in Los Angeles.

Houston—The market continues quiet. Cast market is staying weak with only sporadic purchases being made.



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Get more information. Ask your Kennametal Representative for a demonstration . . . or write KENNAMETAL INC., Latrobe, Pa. 33501

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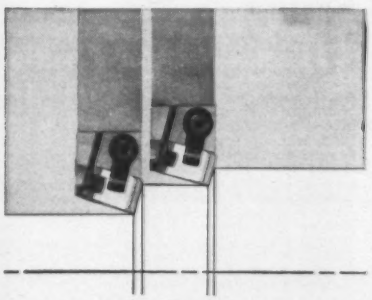
Holders illustrated with clamps and chipbreakers removed show positive seating of both triangular and square inserts. When not required, tool may be used without chipbreaker, with clamp set directly on the insert.



Easily accessible for adjustments. Permits close ganging of tools.

Easy adjustment, regardless of tool position. Just release the clamp and "dial" the breaker to any position desired.

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SCRAP PRICES *(Effective May 17, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	39.00 to 40.00
No. 2 bundles	27.00 to 28.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	20.00 to 21.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	30.00 to 31.00
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rails, random lgth.	50.00 to 51.00
Rails 2 ft and under	57.00 to 58.00
RR specialties	48.00 to 49.00
No. 1 machinery cast.	50.00 to 51.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	42.00 to 43.00
Stainless	
18-8 bundles and solids	200.00 to 205.00
18-8 turnings	100.00 to 105.00
430 bundles and solids	105.00 to 110.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	35.00 to 37.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	43.00 to 44.00
Low phos. punch'gs plate, ¼ in. and heavier	37.00 to 38.00
Low phos. 2 ft and under	35.00 to 36.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	45.00 to 46.00
Rerolling rails	53.00 to 54.00
Rails 2 ft and under	52.00 to 53.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	50.00 to 51.00
RR couplers and knuckles	41.00 to 42.00
No. 1 machinery cast.	51.00 to 52.00
Cupola cast.	45.00 to 46.00
Cast iron wheels	37.00 to 38.00
Malleable	49.00 to 50.00
Stove plate	41.00 to 42.00
Steel car wheels	41.00 to 42.00
Stainless	
18-8 bundles and solids	205.00 to 210.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	105.00 to 110.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	20.00 to 21.00
Clean cast. chem. borings	25.00 to 26.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	37.00 to 38.00
Heavy turnings	28.00 to 29.00
RR specialties	43.00 to 44.00
Rails, 18 in. and under	58.00 to 60.00
Cupola cast.	40.00 to 41.00
Heavy breakable cast.	42.00 to 43.00
Cast iron car wheels	44.00 to 45.00
Malleable	55.00 to 56.00
No. 1 machinery cast.	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	24.50 to 25.50
No. 1 dealer bundles	29.50 to 30.50
No. 2 bundles	19.50 to 20.50
Machine Shop turn.	11.00 to 12.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	36.00 to 37.00
Rails, random length	48.00 to 49.00
Rails, 18 in. and under	55.00 to 56.00
No. 1 cupola cast.	39.00 to 40.00
Hvy. breakable cast.	35.00 to 36.00
Drop broken cast.	49.00 to 50.00

Youngstown

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	36.00 to 37.00

Cleveland

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft & under	38.00 to 39.00
Drop forge flashings	31.00 to 32.00
Low phos. punch'gs plate	32.00 to 33.00
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	34.50 to 35.50
Rails 2 ft and under	54.00 to 55.00
Rails 18 in. and under	55.00 to 56.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	55.00 to 56.00
No. 1 machinery cast.	52.00 to 53.00
Stove plate	43.00 to 44.00
Malleable	49.00 to 50.00
Stainless	
18-8 bundles	200.00 to 205.00
18-8 turnings	90.00 to 95.00
430 bundles	95.00 to 100.00

Buffalo

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 busheling	30.00 to 31.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	16.00 to 17.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	40.00 to 41.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	46.00 to 47.00
No. 1 cupola cast.	42.00 to 43.00

St. Louis

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft	31.00 to 32.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	17.00 to 18.00
No. 1 RR hvy. melting	34.00 to 35.00
Rails, random lengths	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
RR specialties	41.00 to 42.00
Cupola cast.	45.00 to 46.00
Heavy breakable cast.	34.00 to 35.00
Stove plate	39.00 to 40.00
Cast iron car wheels	35.00 to 36.00
Rerolling rails	50.00 to 51.00
Unstripped motor blocks	36.00 to 37.00

Birmingham

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	20.00 to 21.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	11.00 to 12.00
Electric furnace bundles	35.00 to 36.00
Elec. furnace, 3 ft & under	33.00 to 34.00
Bar crops and plate	40.00 to 41.00
Structural and plate, 2 ft.	39.00 to 40.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
Angles and splice bars	41.00 to 42.00
No. 1 cupola cast.	50.00 to 51.00
Stove plate	49.00 to 50.00
Cast iron car wheels	42.00 to 43.00
Unstripped motor blocks	40.00 to 41.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	7.00 to 8.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	10.00 to 11.00
Clean cast. chem. borings	20.00 to 21.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 prepared solids	195.00 to 200.00
18-8 turnings	85.00 to 90.00
430 prepared solids	80.00 to 85.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	16.00 to 17.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	27.00 to 28.00
Drop forge flashings	27.00 to 28.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Heavy breakable cast.	36.00 to 37.00
Mixed cupola cast.	38.00 to 39.00
Automotive cast.	45.00 to 46.00
Stainless	
18-8 bundles and solids	190.00 to 195.00
18-8 turnings	60.00 to 65.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$25.50 to $26.50
No. 2 hvy. melting	20.00 to 21.00
No. 1 dealer bundles	25.50 to 26.50
No. 2 bundles	13.00 to 14.00
No. 1 busheling	25.50 to 26.50
Machine shop turn.	6.00 to 7.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	13.00 to 14.00
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00

San Francisco

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	30.00
No. 2 bundles	20.00
Machine shop turn.	$14.00 to 15.00
Cast iron borings	14.00 to 15.00
No. 1 cupola cast.	44.00

Los Angeles

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	27.00
No. 2 bundles	17.00
Machine shop turn.	15.00
Shoveling turnings	15.00
Cast iron borings	$15.00 to 16.00
Elec. furn. 1 ft. and under (foundry)	42.00 to 43.00
No. 1 cupola cast.	42.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

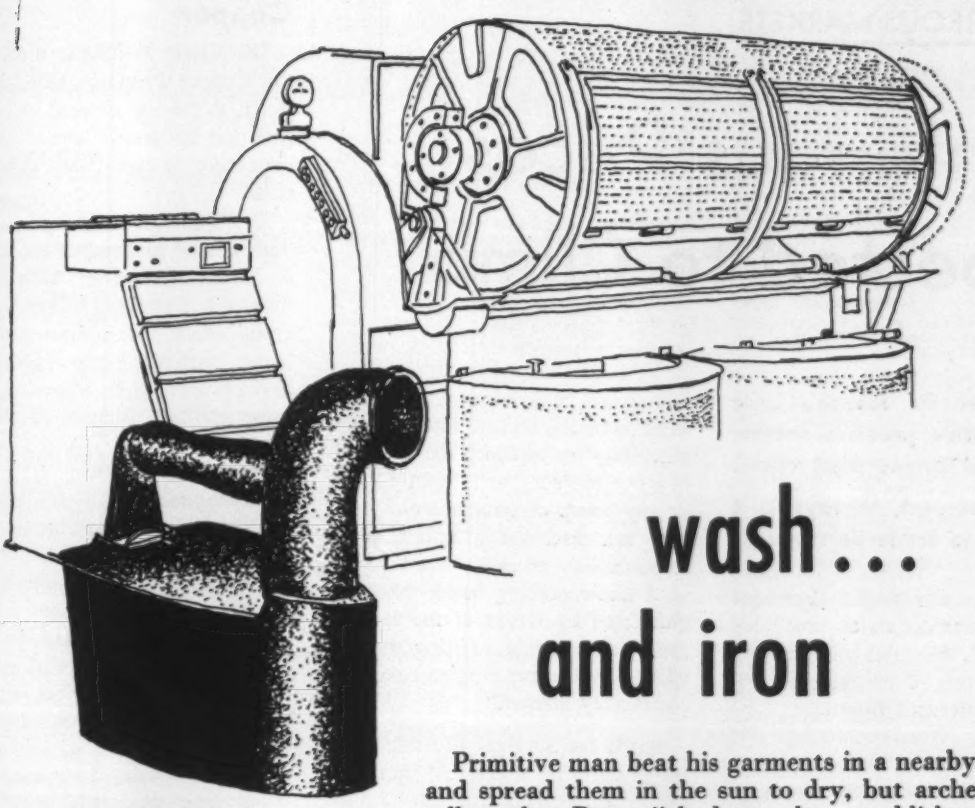
Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.25
No. 2 hvy. melting	28.25
No. 1 dealer bundles	32.25
No. 2 bundles	20.00
Mixed steel scrap	24.25
Bush., new fact., prep'd	32.25
Bush., new fact., unprep'd	26.25
Machine shop turn.	14.00
Short steel turn.	17.00
Mixed bor. and turn.	13.00
Cast scrap	$46.50 to 48.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	31.00
No. 2 bundles	19.00
Machine shop turn.	15.00
Shoveling turnings	17.00
Cut structural plate 2 ft & under	$41.00 to 42.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	26.00 to 27.00



wash... and iron

Primitive man beat his garments in a nearby stream and spread them in the sun to dry, but archeologists tell us that Pompeii had complete establishments for the washing of cloths and linens.

Soap reached western Europe probably by way of Rome; and some 300 years ago pressing irons evolved, heated by charcoal. The first mangle was developed in 1771 in Denmark and taken to England; its name derived from its operation by a man and a girl. In 1782, Henry Sidgier of London constructed a washing machine, and the first all-metal washer was made in the United States in 1890. A power laundry was started in this country in 1845.

Today, a huge tonnage of iron and steel is required for domestic washers and ironers—for the equipping and maintenance of thousands of commercial laundries . . . These and countless other civilian and military uses require an enormous production of steel—and scrap is an indispensable ingredient.

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Nonferrous Prices Expected to Climb

A former St. Joseph's Lead Co. executive predicts nonferrous metal prices must climb.

One deterrent, he says, is a reduction in trade barriers.

■ We can expect "higher prices for the nonferrous metals as time goes on," Felix E. Wormser told the 44th annual meeting of the National Industrial Conference Board.

Why? Mr. Wormser, former Assistant Secretary of Interior, now a retired executive of St. Joseph's Lead Co., New York, asked the group to consider these five facts:

1. The world's use of metals is growing steadily.
2. There are few, if any, easily discoverable mineral deposits left.
3. Mining is a one-crop business.
4. The world's mineral resources are still enormous, but—
5. The grade of ore being commercially handled is getting lower.

Prices "Must" Rise—Mr. Wormser insists these add up to the "inescapable conclusion" that prices must rise, the current depressed state of some nonferrous metals not withstanding.

On the subject of metal shortages, Mr. Wormser says, "Shortages do not occur in a free market. They generally arise through the action of government or war."

He warns that the trend to commodity agreements among governments, such as the International Tin Agreement, may "grow and be applied to other metals."

Raises Doubt—Despite the apparent success of the Tin Agreement to date, Mr. Wormser thinks this would be a mistake. "Government officials on an international basis may try to usurp the function of a free market, but I doubt whether any group of governmental officials can discharge a market price responsibility as well.

"I know nothing better than the unfettered operation of the law of supply and demand to bring about a speedy adjustment of an unbalanced commodity market."

Battle for Survival—In line with his position on unfettered markets, Mr. Wormser hails "the reduction in trade barriers now slowly taking place all over the world." He admits that "the reduction in the U. S. tariff structure on metals and ores has made it difficult for some of our domestic mineral industries that have traditionally depended upon tariff protection to survive."

But Mr. Wormser notes that "tariff itself now occupies a subordinate position as an international trade impediment."

No-Tariff System—On the trend toward common markets, Mr. Wormser believes both the Inner Six and Outer Seven common markets in Europe "should have beneficial results similar to those which accrued to the U. S. from the freedom of trade among our constituent states." In fact, he advocates U. S. and Canada try a no-tariff system.

Will technical progress give a boost to future metal markets? Yes, says Mr. Wormser. Great progress has already been made in more profitable handling of low grade ores.

He also predicts we will get more of our minerals from the ocean.

Copper

Dr. Clyde Williams, director of the Copper Products Development Assn., this week outlined eight projects that his group "either plans to undertake or has under consideration."

Dr. Williams, speaking before the 38th annual meeting of the Copper & Brass Research Assn., said, "There is a plethora of new and exciting ideas for copper products. Some already require engineering, development, while others are long-range and will demand much basic research."

Here is Dr. Williams' slate:

Development of a stainless copper, possibly by metallurgical surface treatment.

Development of organic and inorganic protective finishes for copper, brass, and bronze.

Development of abrasion resistant plastic finishes for copper products and combinations of copper with the newer plastics and glasses to give materials of superior properties and great esthetic appeal.

Increased uses for copper in cast iron and as an alloying element.

New copper-base alloys of unusual properties and utility.

Tin prices for the week: May 11—99.25; May 12—99.375; May 13—99.625; May 16—99.50; May 17—99.50*.

* Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	26.00	24.70	12/17/59
Aluminum ingot	28.10	26.80	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	33.00	35.00	3/11/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; **Other primary prices, pg. 211.**

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.038	.048-.061	.077-.096	.136-.250
1100, 3003	47.8	47.3	46.2	45.1
5052	54.2	53.0	50.8	49.2
6061-0	51.0	49.8	47.9	46.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	44.7-46.2	53.2-60.8
18-32	45.2-46.8	57.7-79.9
33-38	48.8-51.4	83.3-94.5
39-44	58.7-62.4	99.9-121.0

Screw Machine Stock—2011-T-3

Size"	¼	⅜-⅝	¾-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	.....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	.....	48.68	58.78
Munts Metal	53.20	.....	48.26	.....
Comm. Bz.	56.17	56.46	55.86	59.48
Mang. Bz.	58.86	.....	52.21	.....
Phos. Bz. 5%	77.44	.....	78.13	.....

Free Cutting Brass Rod 36.06

TITANIUM

(Base prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; Bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismouth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb).... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 29.95 to 36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz. $2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $213 to $215
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 29.25
- No. 120 ..... 28.25
- No. 123 ..... 27.25

80-10-10 ingot
- No. 305 ..... 33.75
- No. 315 ..... 31.50

88-10-2 ingot
- No. 210 ..... 42.00
- No. 215 ..... 38.75
- No. 245 ..... 34.00

Yellow ingot
- No. 405 ..... 23.75

Manganese bronze
- No. 421 ..... 28.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 25.75-26.00
- 0.60 copper max. 25.50-25.75

Piston alloys (No. 132 type)..28.00-29.00
No. 12 alum. (No. 2 grade)...24.75-25.25
108 alloy 25.25-25.75
195 alloy 27.75-28.75
13 alloy (0.60 copper max.)...25.75-26.00
AXS-679 (1 pct zinc) 25.00-26.00

(Effective May 16, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 25.25-26.25
Grade 2—92-95% 24.00-25.00
Grade 3—90-92% 23.00-24.00
Grade 4—85-90% 22.50-23.50

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 26½
No. 2 copper wire 24½
Light copper 22¼
*Refinery brass 22½
Copper bearing material 21
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 26½
No. 2 copper wire 24
Light copper 23¾
No. 1 composition 20¼
No. 1 comp. turnings 19¾
Hvy. yellow brass solids 15
Brass pipe 14
Radiators 16

Aluminum

Mixed old cast. ..... 14 —15
Mixed new clips ..... 15 —16
Mixed turnings, dry ..... 14 —15

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 23 —23½
No. 2 copper wire ..... 20 —20½
Light copper ..... 18 —18½
Auto radiators (unsweated). 12½—13
No. 1 composition ..... 16½—17
No. 1 composition turnings.. 15½—16
Cocks and faucets ..... 13 —13½
Clean heavy yellow brass ... 11¾—12¼
Brass pipe ..... 13½—14
New soft brass clippings .... 14 —14½
No. 1 brass rod turnings .... 11½—12

Aluminum

Alum. pistons and struts .... 7½— 8
Aluminum crankcase ..... 11¼—11¾
1100 (2s) aluminum clippings 15 —15½
Old sheet and utensils ..... 11¼—11¾
Borings and turnings ..... 7 — 7½
Industrial castings ..... 11¼—11¾
2020 (24S) clippings ..... 12½—13

Zinc

New zinc clippings ..... 7 — 7¼
Old zinc ..... 4½— 5
Zinc routings ..... 3¼— 3½
Old die cast scrap ..... 2¾— 3

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 28-29
Clean Monel turnings 20-23
Old sheet Monel 24-26
Nickel silver clippings, mixed 18
Nickel silver turnings, mixed 15

Lead

Soft scrap lead ..... 8 — 8¼
Battery plates (dry) ..... 3 — 3¼
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 55 —56
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 9¾—10¼
Solder joints ..... 13¼—13¾
Siphon tops 41
Small foundry type ..... 9¾—10¼
Monotype ..... 9¾—10¼
Lino. and stereotype ..... 8¾— 9
Electrotype ..... 7½— 7¾
Hand picked type shells .... 5¼— 5¾
Lino. and stereo. dross ..... 2¼— 2¾
Electro dross ..... 2¼— 2¾

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective May 16, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Coke* 1.25-lb. base box	Electro** 0.25-lb. base box	Holloware Enameling 29 ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**,	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

*Electrogalvanized sheets.

(Effective May 16, 1960)

**7.425 at Sharon-Niles is 7.225

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, B5*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective May 16, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Chicago, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	97.3	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	$.10	8.63	10.10	10.16	11.04	9.25	10.02	9.43	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	7.66	13.14	16.76	.....	.....	.....
Boston**	.10	9.77	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.95	10.10	11.30	10.80	9.15	9.80	9.15	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.89	10.35	11.10	10.55	8.82	9.48	8.99	10.80	17.10	16.10	19.70	20.45
Cincinnati**	.15	9.06	10.41	11.10	10.87	9.20	10.04	9.31	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.83[1]	10.03	11.29	10.66	9.07	9.90	9.11	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**	.15	9.15	10.61	11.45	10.92	9.19	10.04	9.30	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	10.03	12.193	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.29	11.29	9.82	10.54	9.67	14.29	18.30	17.35	22.90	22.29
Memphis	.15	8.55	9.80	.....	8.60	8.93	9.01	8.97	12.11	.....	.....	.....	.....
Milwaukee**	.15	9.03	10.49	11.24	10.69	8.96	9.70	9.13	11.04	17.24	16.24	21.24	20.49
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	16.16	16.50	20.10	20.85
Norfolk	.20	8.29	.....	.....	8.90	8.65	9.29	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.20	10.10	10.99	11.20	9.65	9.95	9.60	12.05	16.58	16.48	20.08	20.03
Pittsburgh**	.15	8.88	10.03	11.18	10.64	8.83	9.51	9.00	11.40	17.10	16.10	19.70	20.45
Portland		10.00	11.75	13.30	11.95	11.50	11.10	9.85	15.30	18.50	17.45	20.75	20.25
San Francisco**	.10	10.27	11.79[2]	11.55	11.88	9.82	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.07	11.44	12.05	11.84	10.17	10.59	9.96	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.07	11.44	12.05	11.84	10.17	10.59	9.96	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.99	10.73	11.48	10.65	8.93	9.60	9.10	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	9.19	9.74	10.89	10.81	9.10	9.78	9.27	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¾" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 13/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1¾" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective May 16, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	Pct
Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	Pct
Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)	
Plain finish—packaged and bulk	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1959 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective May 16, 1960)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	43.75	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford. Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* wensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	175	193	...	214	199	9.10	9.85
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo C9*	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	...	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD ½ In. Blk.	½ In. Gal.	¾ In. Blk.	¾ In. Gal.	1 In. Blk.	1 In. Gal.	1¼ In. Blk.	1¼ In. Gal.	1½ In. Blk.	1½ In. Gal.	2 In. Blk.	2 In. Gal.	2½-3 In. Blk.	2½-3 In. Gal.	SEAMLESS 2 In. Blk.	2 In. Gal.	2½ In. Blk.	2½ In. Gal.	3 In. Blk.	3 In. Gal.	3½-4 In. Blk.	3½-4 In. Gal.
Sparrows Pt. *B3*	9.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	*6.25	.....	*2.25	.....	0.75	.....	1.25	.....	1.75	.....	2.25	.....	2.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Ironton, O., f.o.b.	30.50
Detroit f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearney, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

(Effective May 16, 1960)

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY

CHATTANOOGA 2, TENN.

Special set-up cuts work handling

Combining ingenuity and standard tooling provides a work saving set-up for "big" drilling jobs at Electric Box and Switchboard Company, Chicago. Formerly, 150 to 200 holes in 40 X 72" ebony asbestos and steel switchboard panels were drilled with a conventional drill press, then the work was moved to another location for additional drilling. Now the entire job is completed by one standard Delta Overhead Drill Press. By suspending the drill press from a track 40" long and putting casters on the work table, extra handling and positioning are reduced and special jigs and fixtures eliminated. Set-up permits drilling at any point on a circle 23¾" in diameter.

This is typical of how rugged, versatile Delta Industrial Tools are used throughout industry to supplement or replace costly single purpose machines. For free illustrated booklet of valuable cost-cutting ideas, write: Rockwell Manufacturing Company, Delta Power Tool Division, 640E N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Box 420, Guelph, Ontario.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Chicago	.....	.....	.....	15.60	.....
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R3*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
- Rolled elliptical, 18 in. or longer, 5000 lb lots 48.00
- Electrodeposited 40.00

Brass, 80-20, ball anodes, 2000 lb or more 53.00

Zinc, ball anodes, 2000 lb lots 19.75
(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carton, 5000 lb 1.0225
(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.30

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 65.90

Copper sulphate, 25.2 Cu min, 6000 to 12,000 lbs per cwt $13.75

Nickel sulfate, 5000 to 23,000 lbs... 29.00

Nickel chloride, freight allowed, 100 lb 45.00

Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums 23.70
(Philadelphia price 25.00)

Zinc cyanide, 100 lb 60.75

Potassium cyanide, 100 lb drum N. Y. 45.50

Chromic acid, flake type, 10,000 lb or more 30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R.	11.50
Electrolytic Iron, melting stock, 99.87 pct Fe....	28.75
Carbonyl Iron	88.00
Welding Grades	8.10
Cutting and Scarfing Grades	9.85
Hydrogen reduced, domestic	11.25

Copper Powders

Molding Grades	
Electrolytic, domestic, f.o.b. shipping point.	15.00†
Atomized	46.5 to 64.5
Reduced	15.00†
Chemically Precipitated	15.00†
Brass, 5000-lb lots	35.1 to 52.2
Bronze, 5000-lb lots	53.1 to 56.7
Chromium, electrolytic	5.00
Lead	7.50†
Manganese, electrolytic ...	$1.00
Molybdenum .....$3.60 to $4.35	
Nickel	$1.15
Carbonyl Nickel, 20,000 lb lots	$1.01
Nickel-Silver, 5000 lb lots..	60.7 to 69.0
Silicon	70.00
Solder	7.00†
Stainless Steel, 316	$1.07
Stainless steel 304	89.00
Tin	14.00†
Titanium, 99.25 + pct, per lb, f.o.b.	$11.25
Tungsten .....$3.15 (nominal)	

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80.....	19.70
Trans. 52	17.85	Trans. 73.....	20.20
		Trans. 66.....	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00	
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore $140.00	
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks 52.00-54.00	

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

(Effective May 16, 1960)

MORSE HELPS PUT THE MIGHT IN MACK

Longer lasting, faster cutting Morse tools give Mack smoother holes...increased production...long-range economy.

To build the toughest trucks on the road, Mack tooled up with the toughest tools on the market... Morse.

Sound economics? Sure. Longer lasting, more efficient tools *invariably* produce long-run economy.

Tough Morse cutting tools will add long-range economy... and improved performance... to your job, too. For details, contact your Morse-Franchised Distributor *today*.

MORSE

means "THE MOST" *in Cutting Tools*

MORSE TWIST DRILL & MACHINE CO., NEW BEDFORD, MASSACHUSETTS

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Morse means more production... smoother, more accurate production... with every type of cutting tool from drills, reamers, taps and dies, to end mills, milling cutters, slitting saws and "specials". So, if you want the best from every cutting tool you buy, mark your order "MORSE". For if you want *Morse Quality*, there's only one way to get it... *specify Morse.*

VN

A Division of VAN NORMAN INDUSTRIES, INC.

2298

ELECTRICAL POWER EQUIPMENT IN STOCK

DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3900	New G.E.	Enc. S.V.	475	320
1	3000	New Whse.	Enc. F.V.	525	600
3	2700	G.E.	Enc. S.V.	415	280
1	2250	New G.E.	Enc. S.V.	600	200/300
1	2200	G.E.	Enc. S.V.	600	400/500
2	2000	G.E.	Enc. S.V.	350	230/350
2	1750	G.E.	Enc. S.V.	250	175/350
2	1500	Whse.		600	300/700
4	1500	New Whse.	Enc. F.V.	525	600
2	1400	G.E.	MCF	250	165/300
1	1300	G.E.	MCF-12	300	200/400
1	1300	G.E.	MCF	600	450/600
1	1000	Whse.		500	800/2000
4	1000	GM	D8	600	600/900
2	900	G.E.	MCF	250	180/360
1	850	G.E.	MCF	250	85/170
2	800	G.E.	MCF	250	400/750
2	800	G.E.	MCF	250	730
2	750	G.E.	MCF	600	450/900
1	750	G.E.	M.F.	600	120/360
2	645	S.S.	V.G.	300	1000
4	600	Whse.		250	275/550
1	500	G.E.	MPC-16	250	188/400
2	450	Whse.		550	415
4	400	G.M.	D8	250	300/900
2	400	G.E.	CY-275	300	1000/1500
1	300	Cr.Wh.	H-102 B.B.	230	1200
1	150	Cr.Wh.	CMC-65H	230	1150
1	150	G.E.B.B.	CD	600	250/750
1	150	G.E.B.B.	CDP-125	230	1750
1	135	Cont. B.B.		230	1750
1	100	Whse.	SK-180	230	450/1100
1	100	G.E.	CDP-115	230	1750
1	80	Whse.	SK-123.9	240	2000-4500
1	75	G.E.B.B.	CD-1235-D.P.	600	850

SWITCH GEAR

Large Stock Oil & Air C/BC can furnish in NEMA 1 Enc. or Open Magnetic or Manual Operation. What are your needs & I. C. Requirements.

MG SETS—3 Ph. 60 CY.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
1	4800	G.E.	450	300	2300/4600
1	2400	G.E.	450	300	2300/4600
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	1750	G.E.	514	600	2300/4600
1	1500	G.E.	720	600	6600/13200
1	1500	Cr.Wh. 4 unit	720	100	2300
1	500	G.E.	900	125/250	440
1	500	G.E.	900	250	2300/4600
1	500 (New)	G.E.	1200	300	2300
1	350	G.E.	900	125	440/2300/4160
1	300	G.E.	1200	250	2300/4000
1	300	G.E.	1300	250	440/2300
1	250	G.E.	900	250	440/2300
1	240	Whse.	900	125	220/440
1	200	Whse.	1200	550	2200
1	200	El. Mhy.	1200	250	2300/4600
1	150	G.E.	1200	275	2300
1	150	Whse.	1200	275	2300
1	150	G.E.	1200	250	440
1	150	G.E.	1200	125	440
	140	Cr.Wh.	690	125/250	2300
1	100	G.E.	1170	250	220/440
2	100	Cr.Wh.	S1160	525	220/550
1	100	G.E.	1200	250	2400/4100
2	75	Whse.	1200	125	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	3000	A.C.	OISC	3	34500 x 2300
3	1000	G.E.	OA/FA	1	13800 x 230/460
3	833	A.C.	OISC	1	4800/2400 x 480
3	833	A.C.	OISC	1	10175/13475 x 2300/4000
2	750	G.E.	Pyranol	1	4800 x 85/55-255/165
3	500	Mal.	C	1	6600/11430Yx480
3	500	Kuhl	OISC	1	13200 x 6600
3	150	G.E.	OISC	1	33000x2300/4000Y
3	167	G.E.	HS	1	13800 x 240/480
3	100	G.E.	HS	1	4800/8320Y x 120/240

CRANE & MILL MOTORS

230 V. D. C.

Qu.	H.P.	Make	RPM	Type
12	12/14	Whse.	700/600	MCA-30, Series
1	20	Whse.	975	K-5 Series
3	23	G.E.	650	MDS-408 Shunt
1	35	Whse.	480	CK-9 Comp. S.B.
1	35	Whse.	480	CK-9 Sh. R.B.
1	45	Whse.	600	CK-9 Comp. S.B.
3	50	G.E.	650	COM-1830 Comp.
2	50	Whse.	535	CK-9 Shunt R.B.
2	50	Whse.	600	CK-9 Comp. R.B.
1	60	G.E.	525	COM-1830AEB.B.
1	50	Cr.Wh.	550	SW-50 Comp.
9	125/165	G.E.	425/575	CO-1832 Ser.
1	100	G.E.	475	CO-1832 S.B.
6	100-140	Whse.	500/415	MC-90 R.B.

Above only partial listing of our available stock.

RE-NU-BILT By

BELYEA COMPANY, INC.

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Tel. OLdfield 3-3334

Detroit Used Machine Prices Holding Up

Prices in Detroit are holding steady and sales are better this year than last.

Although not up to earlier expectations, business is good and should stay that way.

■ Used machinery prices in Detroit are holding up well so far in 1960. Dealers and auctioneers interpret this as a sign of business strength.

They point to last summer and fall when the steel strike was staring them in the face. Some dealers slashed prices to stir up interest. Reduced prices were not put on top-notch machines, but on lower-quality equipment. Still there is no such "cut-throat" competition going on today—to the relief of most Detroit sales houses.

No Auto Influence — The ups and downs of automotive production are not affecting the used machinery market. Near-record car output in the first quarter failed to stimulate demand for used tools. On the other hand, April's cutback in car output didn't crimp sales.

Perhaps this is because Detroit's tool and die trade is moving along smoothly, although most tool and die shops emphasize they don't consider themselves overworked.

Below Expectations — Although there's no panic, a few dealers say first-quarter sales didn't reach expectations. This seems particularly true of those engaged in production-type machine tool sales. A company that supplies the auto industry, farm tractor industry, and various engine manufacturers, reports sales in January-March were 10 to 15 pct lower than a year earlier.

A spokesman blamed the showing on bloated inventories of metal product makers and their customers as a result of steel-strike "hoarding" early in the year. He says customers he's talked with all around the country piled up two to three month inventories in the first quarter. He looks for a second-quarter pickup, however, now that inventories are closer to normal.

High and Wide—Production machinery inventories are apparently in good shape. Dealers for the most part indicate they are in excellent position to supply a wide variety of late-model machines of high quality.

Initial inquiries for production equipment centers on late model machinery, dealers point out. But when the companies compare prices of a machine built in the 1950's with a similar one built in the 1940's they are inclined to buy the latter because of its much lower price.

For the Lowest Price—As one dealer says, big corporations and bargain seekers alike say they are interested in speeding up production and lowering operating costs with late model used machinery until they compare prices. When they find out a little-used World War II machine costs half as much, they're often willing to sacrifice production time.

Tool room equipment did better in the first quarter than production equipment. March and April sales were rated as generally good for such items as lathes and mills. Interest was somewhat lower for drills and less for shapers.

BRIGHT ANNEALING FURNACES . . . General Electric

Roller Hearth, 948 K.W. Capacity Equal to New Condition. 27" x 62" Opening, 112' long Convection Circulating Fans. Water Cooled—60' Cooling Chamber 5 ton per hour capacity. Air lock Purge Chambers, Flame Curtain, Max. Temperature 1700. (Chromax) 8000 CFH *Atmosphere* Generators.

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Keep 'em rolling . . . not rusting

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New—Used—Reconditioned railroad freight cars • car parts • locomotives • tank cars • steel storage tanks.

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Corporation

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Diamond 3-1117 Cable MARAILQUIP

PLANT DISMANTLING & LIQUIDATION

Surplus Equipment & Inventories Purchased

CURRY & HUDSON ASSOCIATES, INC.

Gateway Center, Pittsburgh 22, Pennsylvania

RAILWAY EQUIPMENT

USED and RECONDITIONED

RAILWAY CARS and REPAIR PARTS

FLAT CARS

4—50-Ton Capacity, 43' long
Steel Underframe

30—Used, All-Steel
30-Cubic Yard, 50-Ton Capacity
MAGOR AIR DUMP CARS
Excellent Condition—Immediate Delivery

DIESEL-ELECTRIC LOCOMOTIVES
1, G. E. 25-Ton, 150 H.P., Std. Ga.
3, G. E. 44-Ton, 400 H.P., Std. Ga.
1, G. E. 80-Ton, 500 H.P., Std. Ga.
1, 125-Ton RAILROAD TRACK SCALE

IRON & STEEL PRODUCTS, INC.

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No better values at any price

100 CFM	100 psi	6 x 7 Ing. or Worth.
138 CFM	100 psi	7 x 7 Ing.—CPT—Worth.
142 CFM	125 psi	Ingersoll Rand Type 40-Jaeger
183 CFM	150 psi	7 x 7 Joy WG9
191 CFM	300 psi	9-4½ x 9 ES-2
194 CFM	125 psi	7-7-6 x 5 Worth. M40
234 CFM	100 psi	9 x 9 Ing.—Worth. Chic Pneu
290 CFM	75 psi	10 x 9 Ing. ES-1
364 CFM	100 psi	10 x 9 Joy WG9
465 CFM	100 psi	12 x 11 1R—Amer.
502 CFM	125 psi	12 x 13 Ing. Rand.
585 CFM	100 psi	15-9¼ x 12 Ing.
660 CFM	125 psi	11½ x 7 x 7 Joy WN 102
670 CFM	100 psi	15-9¼ x 12 Ing. XRB
800 CFM	100 psi	14 x 13 1R—CPT
877 CFM	125 psi	17/10½ x 14—1R—XRB
1721 CFM	100 psi	23-14x18 Ing. PRE-2
	285 hp.	GE-TS Syn. Motor 3/60/2300
	See it running	
2500 CFM	50 psi	19/19 x 14 Penn—DE—I
	300 hp.	Em syn. Motor 3/60/2300
Portable Gas-diesel	60"-600'	

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MACHINE TOOLS

1—36" Bullard Vertical Turret Lathe, 34" table, Max. 24" under rail, 1 Rail, 1 Side Head, Ser. 9083.

2—6'17" Col. American Radial Drills, Ser. No. 43529.

1—Cincinnati 28/120 Horizontal Hydrotel Milling Machine, Ser. 40M-318256-1.

1—Stoker, Combustion Engineering Type E, Class 10, underfeed, 8'4¾" wide x 10'4" long, steam driven. Spare parts included. Used only four months.

CRANES

1—10 Ton P&H O.E.T. CRANE, cab operated. Serial 10422, lift 14'11", span 39'0½", 3 motors, 230 volt D.C.

1—7½ Ton SHAW O.E.T. CRANE, cab operated, Serial 2416. 3½ ton auxiliary hoist, lift 34'1", span 40'0¾", 4 motors, 230 volt D.C.

1—5 Ton SHAW O.E.T. CRANE, cab operated, Serial 1436, Lift 11'2", span 31'8½", 3 motors, 230 volt volt D.C.

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THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

VERTICAL BORING MILLS
42" King, m.d.
44" Putnam, m.d., p.r.t.
53" Niles Heavy Pattern, m.d., p.r.t.
60" Bullard, m.d.
96" Cincinnati Massive Pattern Vertical, m.d.
Motch & Merryweather Vert. Auto Turning & Forming, m.d.

BROACHING MACHINES
Model HD 10-90 American Broach & Machine Co., Horiz., m.d.
12 x 72" Thompson Automatic Flat Broach, m.d.
10 ton, 84" stroke LaPointe Single Ram Vertical Surface Broach, m.d., late
Type SBD-42-6 American Vertical Hy. Dup. Broach
Type SBD-48-15 American Vertical Dup. Ram Surface Hydraulic Broach

RADIAL DRILLS
2½"-7½" col. Cincinnati-Bickford, m.d.
3'-9" col. American Hole Wizard, m.d.
3'-9" col. Cincinnati-Bickford, m.d.
6'-17" col. American Triple Purpose, m.d.
7'-16" col. American Triple Purpose, m.d.
Baush Radial Drilling & Tapping Machine, m.d.

BALL BEARING DRILLS
No. ½ Avey MA8, m.d.
No. 2 Avey, m.d.
No. 2LMS Leland & Gifford, m.d., H.S.
No. 2LMS Leland & Gifford, single spindle, H.S., m.d.
No. 4BM Fosdick, single spindle H.S., m.d.
No. 4MS Leland & Gifford H.S., 4 speed A.C., m.d. to spindle
1 spindle No. 2MA6 Avey H.S. Type B, m.d., 7½" overhang, 1943
2 spindle Allen, belted m.d., 8" overhang
2 spindle No. 2 Avey H.S., belted m.d.
2 spindle No. 2BMA, No. 1 Avey Production Type, m.d.
2 spindle No. 2MS Allen, H.S., m.d.
2 spindle No. 2 Leland & Gifford H.S., 8" overhang, m.d.
2 spindle Leland & Gifford H.S., Hydraulic Type, m.d.
2 spindle No. 2LMS Leland & Gifford, hydraulic step by step H.S., m.d.
3 spindle No. 28-8" Edlund, m.d., H.S.
3 spindle No. 2MA6 Avey, H. S., m.d.
3 spindle Leland-Gifford #1LMS—H.S., m.d., late

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times

THE EASTERN MACHINERY COMPANY

1002 Tennessee Avenue, Cincinnati 29, Ohio

MElrose 1-1241 CABLE ADDRESS—EMCO

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

TYPICAL FOR MILL & REEL DRIVES

(2)—3500/3000-KW Al.Chal. 5-Unit Sets, (2) 1750-KW. Gen. 350/300—700/600-V.D.C., (1) 5000-HP Syn. Motor 13800/6900/4160-V., 3 ph., 60 cy., with exciters.
(1)—1325-KW Whse. 2-unit Set, Gen. 600-V.D.C., with 2250-HP Syn. Motor 2300V., 3 ph., 60 cy.
(1)—1520-KW 3-Unit Set, (2) 760-KW Gen., 600-V.D.C., (1) 2250-HP Syn. Motor, 2300-V., 3 ph., 60 cy.
(1)—200-KW General Electric 3-unit Set, (2) 100-KW Gen. 250-V.D.C., with 300-HP Syn. Motor, 2300-V., 3 ph., 60 cy.

We can supply various Motors with these Sets, together with exciters and controls as a COMPLETE PACKAGE.

DIRECT CURRENT MOTORS
Adjustable and Contant Speed
(Suitable for MILL and STANDARD DUTY)

Qu.	HP	Make	Volts	R.P.M.
1	3000	G.E.	600	90/180
2—N-*	3000	Whse.	600	600
2—N-*	2700	G.E.	415	280
1—N-*	2500	Whse.	700	108/162
1—N-*	2200	Whse.	600	92/132
2—N-*	2000	G.E.	350	230/350
2—N-*	1750	G.E.	600	200/300
1— *	1500	Al.Chal.	600	120/240
3—N-*	1500	Whse.	600	300/700
2—N-*	1400	G.E.	250	165/300
6—N-*	750	Whse.	250	300/700
1	750	Whse.	250	200/400
2— *	650	S.&S.	300	1000/1350
2	600	Al.Chal.	600	300/600
1	600	Whse.	250	110/220
2	300	Whse.	230	300/600
2	235	Whse.	230	325/975
1	150	Whse.	230	400/1200
1	125	Whse.	230	450/1050
3	125	Whse.	230	350/1125
1—N-*	100	Whse.	250	350/700

N—New and unused.
*—Enclosed forced ventilated.

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25 & 45 Ton G.E. Diesel Electric Locomotives
1—65 Ton Porter Diesel Electric Locomotive
1—Betts-Bridgeford Axle Lathe
30 & 40 Ton Diesel Locomotive Cranes
1—500 KW Diesel Generator, 2300 volts, Slow Speed. New 1950

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HOPPER TANK CABOOSES
FLATS GONDOLAS BOXES
AND SPECIAL DESIGNS

WE WILL REBUILD
TO YOUR SPECIFICATIONS
OR BUILD NEW
AS REQUIRED

RAIL & INDUSTRIAL EQUIPMENT CO., Inc.
30 CHURCH STREET
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PLANT: LANDISVILLE, PA.

UNIVERSAL Machinery & Equipment Co.

AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

ARC MELTING FURNACES
1—250# LECTROMELT—185 KVA
1—500# LECTROMELT—200 KVA
1—1000# SWINDELL
1—2000# SWINDELL—1000 KVA
1—3000# HEROULT, Door Charge—800 KVA
1—6000# STROMAN, gas fired
1—11' LECTROMELT TOP CHARGE
1—13' SWINDELL Top Charge—5000 KVA
DETROIT FURNACES—10 lb. to 3000 lb. Cap.

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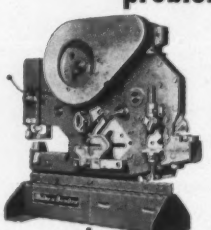

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An asterisk indicates that a booklet, or other information, is offered in the advertisement.

This index is published as a convenience. No liability is assumed for errors or omissions.

A

*Aetna-Standard, Div. Blaw-Knox Co. 120
Ajax-Magnethermic Corp. 130
Alan Wood Steel Co. 200
Albee-Campbell, Inc. 224
*Allegheny Ludlum Steel Corp. .. 4
Allison-Campbell Div., American Chain & Cable Co., Inc. 137
*All-State Welding Alloys Co., Inc. 197
Aluminium Limited Sales Inc. ..90-91
*Aluminum Co. of America 44, 140-141
American Air Compressor Corp. 221
American Chain & Cable Co., Inc., Allison-Campbell Div. .. 137
*American Chain Div., American Chain & Cable Co., Inc. 23
*American Optical Co. 26
American Steel Foundries, Elmes/King Div. 61
Anaconda Aluminum Co. 53
Ansco Div., General Aniline & Film Corp. 102
*Armco Steel Corp. 6
*Armstrong Bros. Tool Co. 182
*Associated Spring Corp. 84

B

*Babcock & Wilcox Co., Refractories Div. 14
*Bailey, William M., Co. 52
Baldt Anchor, Chain & Forge Div. 224
Barnes, Wallace Co., Div. Associated Spring Corp. 84
Barnes-Gibson-Raymond, Inc., Div. Associated Spring Corp. .. 84
*Bausch & Lomb 34, 169
Bay State Abrasive Products Co. 72-73
Bearings, Inc. 174
Belyea Co., Inc. 220
Bethlehem Steel Co. 1
*Blaw-Knox Co., Aetna-Standard Div. 120
Blaw-Knox Co. 224
Blaw-Knox Co., Foundry & Mill Machinery Div. 83
*Bliss & Laughlin, Inc. 203
*Bridgeport Brass Co. 54
Brown & Williams Construction Co. 223
*Buell Engineering Co., Inc. ... 199

C

Calumet Iron & Supply Co. 224
Carco Industries, Inc. 224
Carlstrom Pressed Metal Co. 223
Carpenter Steel Co. 17-22
Carpenter Steel Co., Alloy Tube Div. 60
Chambersburg Engineering Co. .. 198
Cities Service Oil Co. 96
Columbia-Geneva Steel Div., United States Steel Corp. 79-81
*Commercial Shearing & Stamping Co. 12
*Commonwealth of Pa., Dept. of Commerce 168
Consumers Steel & Supply Co... 224
*Continental-Diamond Fibre, Subsidiary Budd Co. 71
*Copperweld Steel Co., Aristoloy Steel Div., Inside Front Cover
Copperweld Steel Co., Superior Steel Div. 193
Crucible Steel Co. of America 92-93, 166-167
Curry & Hudson & Associates, Inc. 221
Cutler-Hammer Inc. .....Back Cover

D

*Danly Machine Specialties, Inc. 183
*Delta Power Tool Div., Rockwell Mfg. Co. 217
*Denison Engineering Div., American Brake Shoe Co. 119
Dixie Bearings, Inc. 174
DoAll Co. 36
Dunbar Bros. Co., Div. Associated Spring Corp. .. 84
*Duraloy Co. 27

E

Eastern Machinery Co. 221
*Elastic Stop Nut Corp. of America 55
*Elwell-Parker Electric Co. 194

F

*Farrel-Birmingham Co., Inc., Watson-Stillman Press Div. 104
*Fenn Manufacturing Co. 144
Foote Bros. Gear & Machine Corp. 66
*Formed Steel Tube Institute ... 106

G

General Aniline & Film Corp. . 102
General Electric Co., Apparatus Dept. 24-25, 103
General Electric Co., Specialty Control Dept. 58-59
Gibson, Wm. D., Co., Div., Associated Spring Corp. 84
Gilbert Merrill Steel Corp. 224
Goodman Electric Machinery Co. 223
*Goodyear Tire & Rubber Co., Industrial Products Div. 10
Goss & DeLeeuw Machine Co. .. 182
Gray, G. A., Co. 74-75
Greist Manufacturing Co. 224
*Gulf Oil Corp. 64-65

H

Hallidie Machinery Co., Inc. .. 223
*Hayes, C. I., Inc. 13
Heller Tool Co. 41
Heller's E. G., Son 222
Hughes, Arnold, Co. 223, 224
Hydraulic Press Mfg. Co. 97
Hyman, Joseph, & Sons 222
Hyster Co. 124

I

*Ingersoll-Rand Co. 127
International Nickel Co., Inc. .. 78
Iron & Steel Products, Inc. 221
Ironsides Co. 31

J

Jones & Laughlin Steel Corp., Stainless & Strip Div. 172-173

K

Kaiser Aluminum & Chemical Sales Inc., Kaiser Chemicals Div. 184-185
Kaiser Engineers 187
Kaplan, M. S., Co. 209
*Kardong Brothers, Inc. 182
Kennametal Inc. 207
Keystone Forging Co. 224
Keystone Steel & Wire Co. 101
*Kidde, Walter, & Co., Inc. 15
Kinderman, Lou. F. 223
Kingsbury Machine Tool Corp. .. 226
Kirk & Blum Mfg. Co. 224

L

*Lamson Corp. 180-181
*LaSalle Steel Co. 105
Latrobe Steel Co. 89
*LeBlond, R. K., Machine Tool Co. 108
*Leeds & Northrup Co. 68
Lindberg Engineering Co. 48-49

M

MacCabe, T. B., Co. 222
Machine Tool Exposition 40
Machinery Consultants, Inc. 221
*Maine Dept. of Economic Development 141
*Malayan Tin Bureau 195
Marshall Railway Equip. Corp. .. 221
Metal Carbides Corp. 43
Miles Machinery Co. 222
*Milford Rivet & Machine Co. 186
Mobil Oil Co. 138-139
*Monarch Machine Tool Co. ...69-70
Monsein, Samuel S. 224
Morgan Construction Co. 5
Morse Twist Drill & Machine Co.. 219

N

National Acme Co. 50-51
*National Automatic Tool Co. ..28-29
National Business Bourse, Inc. .. 224
National Carbon Co., Div. Union Carbide Corp. 45
National Machine Tool Builders Assoc. 40
National Machinery Exchange .. 222
National Steel Corp. 37
National Tube Div., United States Steel Corp. 79-81
New England Pressed Steel Co. . 223
Nicholson File Co. 46
Norton Co., Abrasive Grinding Wheel Div. 32-33
Norton Co., Machine Tool Div. 142-143

O

Ornitz Equipment Corp. 222

P

Pangborn Corp. 94-95
*Penn Metal Co., Inc. 63
Pollock Industries, Inc. 222
*Pope Machinery Corp. 192

R

*R-S Furnace Co., Inc. 11
Rail & Industrial Equip. Co., Inc. 222
*Raybestos-Manhattan, Inc., Manhattan Rubber Div. 76-77
Raymond Manufacturing Co., Div. Associated Spring Corp. .. 84
*Reliance Electric & Engineering Co. 42
Republic Machinery Co. 222
*Republic Steel Corp. 98-99
Reynolds Metals Co. 177
*Rockwell Manufacturing Co., Delta Power Tool Div. 217
Roebling's, John A., Sons, Div. Colorado Fuel & Iron Corp. 67
Rosedale Foundry & Machine Co. 223
*Ross, J. O., Engineering, Div. Midland-Ross Corp. ..146-147
Russell, Burdsall & Ward Bolt & Nut Co. 30
Ryerson, Jos. T., & Son, Inc. 8, 134

S

Sandvik Steel, Inc. 148
*Salas Corp. of America 86-87
*Sharon Steel Corp. 56-57
*Sherritt Gordon Mines Ltd. 145
*Signode Steel Strapping Co. .. 179
*Simonds Abrasive Co. 85
Smith, A. O., Corp. 205
Smith, Thomas, Co. 224
Socony Mobil Oil Co. 138-139
Sperry Products Inc. 165
Stanhope, R. C., Inc. 223
Struthers Wells Corp. 221
*Sunbeam Equipment Corp. 191
*Sun Oil Co. 32
Superior Steel Div., Copperweld Steel Co. 193
Surface Combustion, Div. Midland-Ross Corp. 38-39
*Swift-Ohio Corp. 197

T

*Taylor Fibre Co. 190
Tennessee Coal & Iron Div., United States Steel Corp. 79-81
Timken Roller Bearing Co. 122
*Towmotor Corp. 47
*Trabon Engineering Corp. Inside Back Cover
Tubular Rivet & Stud Co.....170-171

U

*Udylite Corp. 62
Union Carbide Corp., National Carbon Co. Div. 45
United States Rubber Co., Mechanical Goods Div. 189
*United States Steel Corp. 79-81
United States Steel Export Co. 79-81
United States Steel Supply—Steel Service Centers, Div. United States Steel Corp. 79-81
Universal Machinery & Equipment Co. 222

V

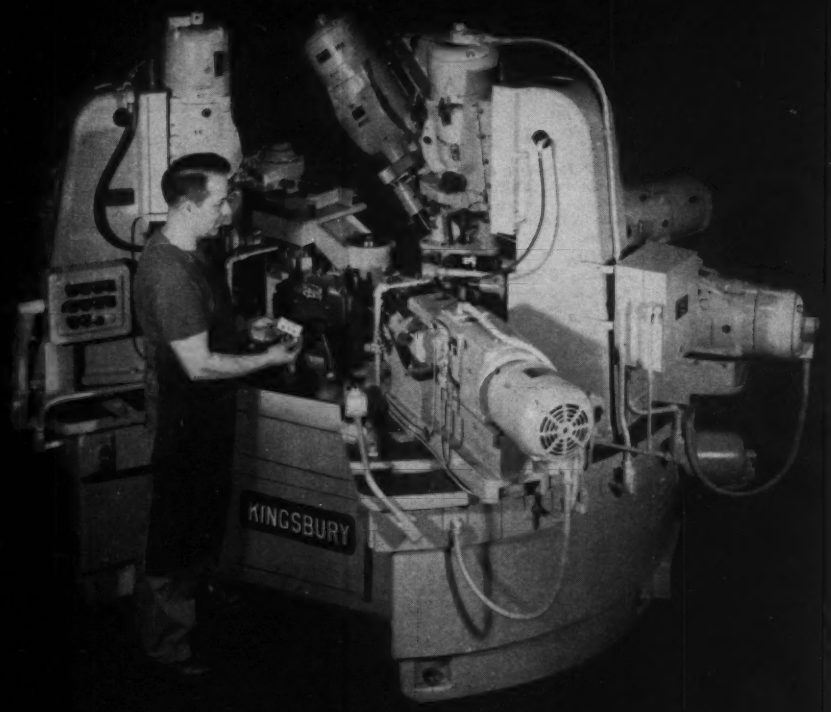
*Valvoline Oil Co. 16
Vanadium-Alloys Steel Corp. 128
Vascoloy-Ramet Corp. 82
*Vaughn Machinery Co. 135

W

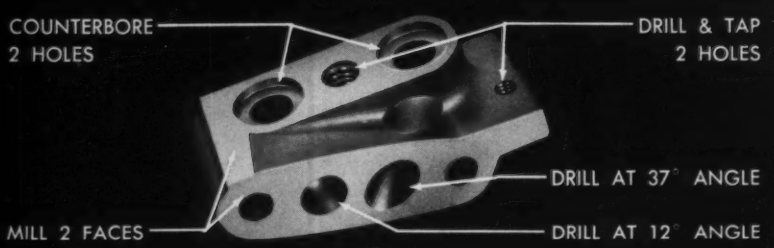
*Waldron-Hartig Div., Midland-Ross Corp. 146-147
Wallack Bros. 224
*Watson-Stillman Press Div., Farrel-Birmingham Co., Inc. .. 104
*Wean Equipment Corp. 100
Weatherly Foundry & Mfg. Co... 223
Weirton Steel Co. 37
Weiss, B. M., Co. 222
Weiss Steel Co., Inc. 224
*Wheelabrator Corp. 182
Wheland Co. 217
Whisler Equipment Co. 223
*Whiting Corp. 88
Wilcox Forging Corp. 223
*Williams, J. H., & Co. 35
Wyckoff Steel Co. 196

CLASSIFIED SECTION

Clearing House 220-223
Contract Manufacturing 223-224
Employment Exchange 224
Equipment & Materials Wanted.. 224



10-spindle Kingsbury combines milling with other operations



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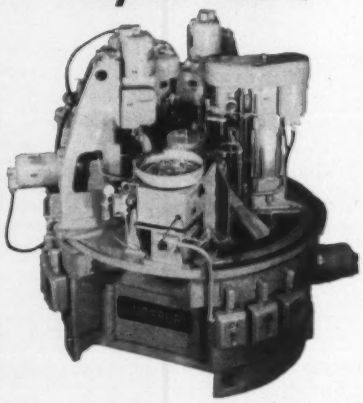
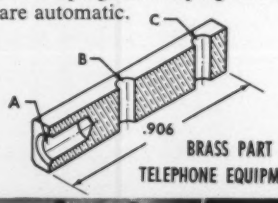


Gross production for this 8-spindle Kingsbury is 1,400 parts per hour for drilling the three holes, countersinking A and burring B and C top and bottom. Parts are fed from the hopper via a chute to an air-operated loading mechanism. Clamping, unclamping and ejection are automatic.



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In November, 1929 Shakespeare Co. of Kalamazoo, Mich. set up this Kingsbury with their fixtures. It drills five holes and reams two in a part used in fishing tackle. Net production rate is 600 parts per hour.

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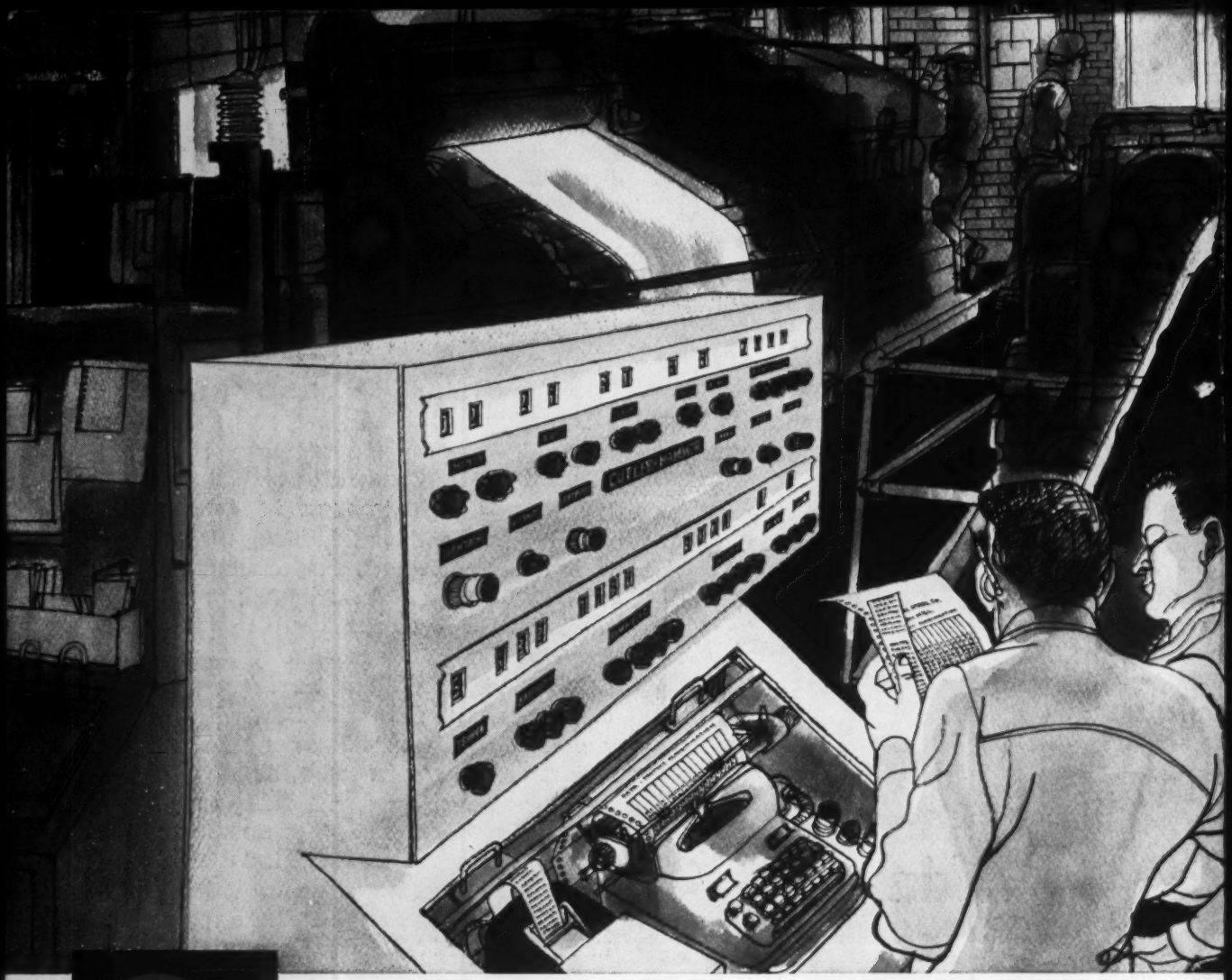
...and how Trabon lubricates a 92-foot Bath Radial Draw Former

The stainless steel skins and structural members of an Atlas missile require great strength. They must resist corrosive fuels from the inside, jarring frictional stresses from the outside. The 92-foot Bath Radial Draw Former (pictured within the rocket) helps stainless steel sheets meet these demands by controlled stretching with Bath tension-yield control and thereby strengthening them for their ordeal through Space! Since stretch-forming requires precision work, nothing must interfere with the machine's operation. That's why there are three Trabon automatic centralized lubricating systems protecting 88 bearing points on this giant machine. Trabon automatically *and positively* delivers an exact amount of clean lubricant to *all* bearings from one central location *while the machine operates.* No bearings are ever missed. Trabon eliminates bearing failure due to improper lubrication, saves man hours, lowers lubricant consumption. Trabon systems are designed for hydraulic, pneumatic, mechanical and electric-motorized equipment. Write for full technical details today.

This Bath Radial Draw Former stretch-forming "skin" for Atlas missiles at Convair-Astronautics in San Diego, Calif. is protected by three Trabon Centralized Lubricating Systems. (Lubricant pump and feeders of the Trabon system are in white). Trabon systems are famous for protecting bearings under the toughest industrial applications.

"Centralized" OIL AND GREASE SYSTEMS *"Meterflo"* CIRCULATING OIL SYSTEMS

Trabon® **Trabon Engineering Corporation** 28815 Aurora Road • Solon, Ohio



CONTROL

New machine with a memory licks a quality problem 3 miles long!

It's relatively simple to control quality of tinplate sheets by running them individually through sensing stations. But, how do you check and control quality in a *coil* of tinplate up to 16,000 feet long?

Working with a leading tinplate producer, Cutler-Hammer engineers devised an ingenious new type of computer that hooks right onto the sensing stations and automatically keeps track of every defect. When the tape is checked, production controls can be quickly adjusted to compensate for any deviation from standard.

This is an example of the new thinking, the new vitality at Cutler-Hammer. We're on the move . . . with new products, new ideas, new engineering talent. We've solved problems that other companies in our field wouldn't even tackle. One of our divisions, with extensive microwave and electronic experience, gives us even more creative muscle in all fields of industrial automation.

Even our trademark's new, to symbolize the new Cutler-Hammer. Phone one of our sales offices and see how we can fit on your team.

WHAT'S NEW? ASK...

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CONTROL

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